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DICTIONARY

OF

PRACTICAL MEDICINE.

ABDOMEN. *SYN.* *Ventre*, Fr. *Unterleib*, *Bauch*, Ger. *Ventre*, *Pancia*, Ital. *Belly*, Eng.
EXTERNAL EXAMINATION OF THE ABDOMEN IN DISEASE.

CLASSIFICATION.—*PATHOLOGY.* *Semeiology*, or *Symptomatology*; *Diagnosis*.

1. The abdomen may be considered as the fundamental part of the frame, inasmuch as it is never wanting in monstrous foetuses; and as it contains parts which are the first formed in the embryo, and are the centres and sources of organic life. The number and importance of the viscera contained in its cavity; the number, the diversity, the extreme frequency and complication, of the maladies to which these viscera are liable, and circumstances which pressingly urge upon the practitioner a careful examination of the parietes of this cavity, in order to ascertain the nature and extent of disease. Much, however, will depend upon the manner in which the examination is made, in respect both of acquiring information as to the existing state of disease, and of drawing inferences as to its origin, and the best means of removing it.

2. Pathologists have generally divided the abdomen into certain *Regions*, with the view of describing with more accuracy the seat of morbid actions. These regions are marked out by means of imaginary lines, drawn in horizontal and vertical directions. The horizontal lines, four in number, divide this cavity into three zones. The highest of these lines pass over the xiphoid cartilage; the second, by the margin of the tenth rib; the third, by the anterior and superior spine of the ilia; and the fourth, by the superior margin of the pubis: thus giving three zones, the epigastric, the umbilical, and the hypogastric.

3. For the sake of additional precision, each of these zones is divided into segments by vertical lines, also four in number, drawn from the acromial extremity of the right and left clavicles to the insertion of the ligaments of Poupart; and from the posterior margins of the axillae, over the most exterior part of the crests of the ilia, to the large trochanters. The spinous processes of the vertebrae may likewise be considered as forming a fifth line of demarcation; as we cannot overlook the posterior parts of the body in our investigation of many of the diseases affecting the abdominal organs. The vertical lines now enumerated, dividing the horizontal lines very nearly at right angles, give us nine regions on the anterior and lateral aspects of the abdomen, and six posterior regions. The anterior regions are the epigastric,

umbilical, hypogastric, and right and left inguinal; the lateral regions are the right and left hypochondriac, and right and left iliac; the dorsal regions are the inferior dorsal—right and left, the right and left lumbar, and the right and left gluteal regions.

4. It does not belong to the scope of this work to enumerate the anatomical boundaries of the abdomen; the parts forming its parietes; or the viscera contained in each region. These are matters which are, of course, familiar to all who peruse this work. But it is necessary to remind the reader, that organs which, in the healthy state, are always situate in a particular region, will be so changed in form and bulk by disease as frequently to extend to adjoining regions, where they will often be detected upon a careful examination; or they will be altogether displaced, either by the specific gravity of their contents, or by tumours developed in their structure. The former phenomenon is often remarked in respect of the liver, spleen, kidneys, ovarium, uterus, &c.; the latter, in the stomach, pylorus, gall-bladder, colon, &c.

5. This change of the position of the abdominal viscera is chiefly observed in the more chronic kinds of organic diseases, and is pointed out in the articles in which they are described: it is generally more manifest in one posture of the body than in others; and is to be ascertained, with the other maladies to which these viscera are liable, by the modes of examining the abdomen about to be explained, assisted by other rational or inferential symptoms. These modes may be made the source of much information as to all the relations of abdominal diseases; but attention, repeated observations, and much natural discernment, are required to obtain from them all the knowledge they are capable of conveying. I shall discuss this subject in the brief manner to which I am necessarily driven, by noticing, I., *Inspection*; II., *Manual examination*; III., *Percussion*; and, IV., *Ascultation* of the abdomen.

6. I. *INSPECTION* by the sense of sight merely, although the best mode of acquiring an idea of the form, size, and motions of the abdomen, is chiefly valuable as a means of investigating the diseases of its viscera in conjunction with the other modes just enumerated; yet simple inspection furnishes us with the most important information in many diseases, particularly in those of infancy and childhood, as well as in many acute and chronic maladies occurring in adults. The form of the abdomen, although necessarily in some measure

changed by marked variation of its bulk, may, nevertheless, be much altered without any decided difference in its size. Thus, it is somewhat changed in severe diseases of the respiratory passages, when the entrance of air into the lungs is obstructed; the epigastrium and hypochondria being then pressed inwards and upwards; whilst in some morbid states of the liver and gall-bladder, of the spleen, and of the ovaria, an unusual prominence in their respective regions is frequently observed. But the most remarkable changes in the form of the abdomen is met with when the size of the cavity is also altered. It is scarcely necessary to allude to examples; but, in all those diseases attended with enlargement or diminution of the bulk of this important part of the body, either in one of its regions, in several of them, or in all, inspection should always be performed: it gives greater precision to manual examination; enables us to compare the bulk of a region with the corresponding region on the other side, and with others in its vicinity; and impresses upon the memory the changes which the part may experience during the progress of disease. It should, therefore, never be neglected in all the forms of abdominal distension; in peritonitis, chronic or acute; in inflammation of the stomach, liver, spleen, and bowels; in the different kinds of colic, in fevers, in uterine and ovarian diseases; in affections of the kidneys and urinary organs; in all disorders accompanied with obstruction to the excretions; and, in short, in all chronic maladies. It ought never to be overlooked in the diseases of infancy and childhood, of whatever nature they may be.

Besides, however, attending in those diseases to the form and size of the abdomen merely, the motions which it presents ought not to be neglected. When rightly interpreted, they often furnish important diagnostic and therapeutic hints. But they require to be viewed in connection with the motions of the thorax, and state of the heart's action. In diaphragmatitis, peritonitis, gastritis, enteritis, and certain states of hepatitis, the motions of the abdomen are slight or obscure, whilst the actions of the thorax are increased. On the other hand, in several severe diseases of the respiratory organs, particularly in croup, laryngitis, bronchitis, several varieties of asthma, pleuritis, pneumonia, &c., the parietes of the chest are nearly motionless; whilst the movements of the abdomen, especially at the epigastrium, in croup and asthma, are remarkably increased, or laborious. The motions of the abdomen, also, are often not limited to those caused by respiration; but in some cases, particularly in organic changes of the heart, pericardium, aorta, &c., and even in certain nervous disorders implicating these organs, comprises those occasioned by the action of the heart, increased by the state of the large abdominal vessels, and by the emaciation or other morbid condition of the patient.

8. II. **MANUAL EXAMINATION** of the abdomen is one of the most important means of diagnosis we possess; but it furnishes information in proportion to the perfection of manner in which it is made. In this very requisite mode of investigation, the temperature of the hand of the practitioner at the time of making it should be attended to, in the great majority of diseases; both as a moderate warmth of the hand is necessary to the delicacy and accuracy of touch, and as

its application to the surface of the abdomen is not in that state occasion any disturbance or contraction of the muscular parietes. In entering upon the examination, care should be taken not to excite the alarm of the patient. The hand ought to be applied at first in the gentlest manner possible. By observing this three very important objects will be best obtained; namely, a knowledge of the form, of the temperature, and of sensibility of the surface of the abdomen.

9. As much more information than is required from manual examination, the hand should be directed to place itself in a suitable position for a more general and extensive investigation. He should be placed on his side with the head and shoulders slightly and comfortably elevated, and the thighs drawn near a right angle with the trunk. If the bladder full, it should be emptied. When proceeding to examine, the patient should be told to relax the muscles, particularly the abdominal muscles. Commencing, therefore, with the utmost gentleness, and passing the hand slightly over the abdomen, we should slowly increase the pressure with the view of ascertaining the following conditions:—1st, Its temperature; 2d, Its size; 3d, Its sensibility; 4th, Its degree of tension and firmness; 5th, The existence of emphysema, tumours, &c.; 6th, The presence of fluids; 7th, The probable existence of accumulated secretions and fecal matters; 8th, Its protrusions and displacements. On these I now proceed to offer a few remarks.

10. 1st, The temperature of the abdomen furnishes most important indications as to the nature of disease. It is generally always higher than natural in diseases of increased action; and often higher when the patient is actually complaining of cold, particularly at the commencement of fevers. In many fevers and in affections of the abdominal viscera, particularly of a dangerous or malignant character, increased temperature is accompanied with peculiar acrid pungency to the sensation of the examiner; a phenomenon which indicates the utmost risk of rapidly supervening dissolution. Diminished temperature of the abdomen is met with in the period of depression, or at the commencement of fevers, but very rarely at their termination, even in death, unless the disease be most malignant or liquescent forms. It is also met with after injuries of the abdomen, particularly blows on the epigastrium, in anæmia, and other disorders of debility.

11. 2d, The form and size of the abdomen are frequently altered, as already noticed (¶) in order to ascertain the nature of the disease, various means of investigation are required, particularly those which are now to be considered. When proceeding with the examination of the abdomen, it is necessary gently to increase the pressure, and, if pain is not complained of, to make it in different directions,—laterally, downwards, and backwards to the spine,—so that if a fluidity of any of the contained viscera is not escaped detection, but be accurately estimated; and the examination always be made with a careful observer effects upon the expression of the countenance of the patient. It will also often be required

form the manual examination, now with the points of several fingers, now with the whole of one, or even of both hands; and occasionally, at the same time that a full inspiration is being made. But it should always be performed with attention to the sensations of the patient, particularly as expressed by the countenance, and to the feelings and ideas it may excite in our own minds. Even the state of action in which the abdominal muscles are often thrown by the examination; the degree of pressure occasioning such action; and the circumstance of tension of those muscles preceding the examination, or being excited by it; as well as the continuance of their contractions, and the periods and occasions of their relaxation, are all important matters in our estimate of the state of the viscera underneath,—more particularly in the various states of inflammation seated in the peritoneum, in the alimentary canal, &c.

12. 3d, The sensibility of the parietes of the abdomen is most intimately associated with that of the contained organs, both in health and disease. The sensibility of the epigastric region varies most widely in different persons. It is frequently, even in tolerable health, very great in delicate and thin females. It is always so in inflammation of the viscera, more particularly when the serous membranes are affected; and the more superficial the inflammation, the more tender is the surface. In order to obtain an accurate idea of the state of the sensibility of the abdomen, pressure should be commenced in the gentle manner, and with the fingers and palm of the open hand. When the patient cannot endure the slightest touch, the disease is then commonly in the parietes, or in the serous membrane reflected over them. When the cause exists more deeply, the tenderness is less acute, and the muscles are almost instinctively brought into action, even before pressure is made, in order to protect the diseased viscera from it.

13. When superficial tenderness is absent, the examination may be made with increased pressure, in order to ascertain the presence of tenderness, pain, or soreness, in any degree or at any part. But caution in thus increasing the pressure is always necessary when the parenchyma of an organ, particularly of the liver or spleen, is enlarged or otherwise affected; for many such affections may be very serious, and yet the sensibility of the diseased part not much increased. I have known rupture of an enlarged and softened spleen occasioned by the rudeness of the examination; and writers have mentioned similar accidents to have occurred to the liver.

14. 4th, The tension and firmness of the abdomen require attention, and due estimation of their actual amount; and in connection with the other diagnostic indications furnished by the examination. Thus, when the tension is associated with increased temperature and sensibility, inflammation of one or more organs underneath, particularly of the peritoneum, may be predicted. The tumefaction, degree of sensibility, position of the patient, &c. will further prove the accuracy of the diagnosis. Tension and firmness are always present in the different forms of peritonitis and inflammations of the subjacent viscera, but not uniformly throughout all their stages. Even in the worst or most malignant forms of peritonitis, as those met with in puerperal females, these symp-

toms are often either almost altogether wanting, or they exist for a short time only. When effusion of a serous or sero-purulent matter occurs in peritonitis, or when suppuration has followed inflammation of the enveloped viscera, tension as well as firmness disappear. They are generally, however, both present, even when the sensibility of the parietes is not much greater than natural, in chronic peritonitis with the formation of false membranes, or the agglutination of the opposing surfaces of the viscera.

15. 5th, The presence of tumours, or other morbid growths, or the fact of their absence, has also to be ascertained by a manual examination. This information can be obtained only by this mode of investigation, carefully conducted. If we detect any degree of unusual tumefaction or hardness, we should endeavour to ascertain its exact site; its form, size, connection, its consistence, degree of sensibility; and whether it is fixed or moveable, soft and yielding, or hard; pulsatile or not. The situation of the tumour; its size, form, and degree of fixedness, will enable us to form an idea of the part affected: whilst the absence or presence of morbid sensibility in it, of fluctuation and pulsation, and the manner in which the nearest parts of the abdominal parietes are affected by it, will furnish important indications of its nature. When tumours or unusual circumscribed indurations are detected in any part of the abdomen, we should bear in mind that their sources and kinds are numerous: that they may be formed in the liver, pancreas, spleen, stomach, pylorus, mesentery, omentum, cæcum, kidneys, uterine organs, &c.; that their nature may be extremely various; and that they may consist either of accumulations of some fluid contained in a cyst, or infiltrated in the substance of an organ, or enclosed in its natural cavity, the outlet of which has been obstructed; or of a deposition of some morbid structure, the nature of which can only be known by a comparison of numerous symptoms, and the history of the disease. Care should be also taken that the accumulations of fecal matters occasionally formed in the cæcum, and in various parts of the colon, or that an unusual anterior protuberance or curvature of the inferior dorsal or lumbar vertebrae, be not mistaken, as have sometimes happened, for morbid growths; and that unusually large collections of the natural secretions in their cysts, as of the bile and urine, owing to temporary obstruction to their discharge, be not treated as morbid formations of a very different kind. I have known cases in which distension of the gall-bladder, from great accumulation of the cystic bile, was mistaken for abscess of the liver; and an enormously distended urinary bladder was viewed as dropsy.

16. 6th, The presence of fluids effused into the peritoneal sac is best ascertained by placing the patient in the erect posture. If this cannot be done, and if he cannot even sit up, the shoulders and limbs should be placed low; and, whether in the erect or recumbent posture, the palm of one hand laid with a gentle pressure upon one side of the abdomen, whilst we apply, somewhat smartly with the other hand, on the opposite side. The impulse occasioned by the stroke will occasion, if fluid be effused, a vibratory undulation or shock which will be felt by the other hand, and which constitutes the diagnostic

symptom in diseases of the abdomen attended with effusion.

17. 7th, *Accumulation of fecal matters* in the bowels are not unfrequently mistaken for tumours. These matters usually collect and harden in the cæcum, or in some part of the colon. They seldom accumulate in the small intestines, unless they consist of certain kinds of *intestinal concretions* (see the art.); which are with difficulty distinguished from tumours seated in some one of the abdominal viscera. It is indispensably requisite to examine the abdomen carefully in all cases of habitual or occasional constipation, particularly in the region of the cæcum and course of the colon; as, when conducted with an experienced tact and discrimination, these collections will generally be ascertained: and when the history of the case, and numerous contingent rational symptoms, are taken into account, little risk will be run of confounding them with morbid growths. The accumulation of secretions in the gall-bladder, and in the urinary bladder, are chiefly, particularly the latter, ascertained by manual examination. The diagnosis of those disorders is fully pointed out in another place.

18. 8th, *Protrusion* of some part of the abdominal contents, giving rise to any either of the more common kinds of *Hernie*, or of those which are unusual, should never be overlooked. Inguinal, femoral, and umbilical herniæ are so frequent, and, when either incarcerated or strangulated, occasion so serious effects, that in all cases where severe symptoms are referred to any of the viscera contained in the abdominal cavity, or in its vicinity, or when the functions of the bowels are obstructed, this source of mischief should be particularly enquired into.

19. I may observe generally, in respect of manual examination of the abdomen, that it furnishes valuable means of diagnosis in very many diseases, particularly when estimated in due connection with those derived from other sources; but I should add, — what I shall often have to prove hereafter, — that it does not always give us exactly the same kind of information that is stated in several, and even in some very recent, works. Thus it is said to be the most certain means of ascertaining the presence of enlarged mesenteric glands, and by actually feeling these glands enlarged. Now this is not the case, and I state it from an experience of many hundred cases: for there are comparatively but few instances in which these enlarged glands can be satisfactorily detected, by the most careful manual examination. But this mode of investigation furnishes certain indications of their presence of a different kind from that which writers have laid down. It may also be remarked, that a manual examination of the abdomen is generally much more successfully made in lean subjects, in females than in males, and in children than in adults; whilst in muscular men, and in fat persons, it furnishes much less information, owing to the muscularity and thickness of the abdominal parietes.

20. III. *Percussion* has been employed as a means of diagnosis in diseases of the abdomen from a very early period of medical knowledge, but chiefly with a view of recognising tympanitic affections, or unusual accumulations of air, and dropsical effusions; and it was not until very lately that attention was directed to it as a means

of investigation in a very large proportion of other diseases of the abdominal viscera. Percussion of the abdomen as well as of the thorax is either *direct* or *mediate*: the former is that which was first ably insisted on by AGENBRUGGER, and brought into notice by CORVISAART, chiefly in the investigation of thoracic diseases; the latter, both in its application to abdominal and thoracic affections, is the invention of M. PROBY, who has paid great attention to its perfection, and has written ably on it as a means of diagnosis.

21. *Direct percussion* consists of simply striking the parts, somewhat smartly, with the points of two or more fingers united and brought to the same plane, and attending to the sounds elicited. *Mediate percussion* is performing the same with a thin plate of ivory, box wood, or any other hard elastic body, placed over the part to be thus examined, and striking upon it. The advantages derived from having such a body interposed between the surface and the fingers are, 1st, The part is protected in a great measure from the stroke, which, although slight, yet is frequently unpleasant to delicate and sensitive persons; 2d, It assists in the production of the sound for the obtaining which percussion is employed. (See art. *PERCUSSION*.) The body on which the percussion is thus made usually consists of a small ivory plate of about $2\frac{1}{2}$ or 3 inches in diameter: M. PROBY calls it the *pleximeter*, or measure of percussion. In all cases in which we wish to examine the abdomen by percussion it will be necessary to use the pleximeter. The formation it conveys varies according to the state of the parts underneath. If we place it over the liver, percussion gives out a dull sound; from the circumstance of a dense body lying beneath that part of the abdominal parietes: if it be moved in the course of the stomach and colon, a sound will be elicited clear in proportion to the quantity of air contained in these viscera.

22. During our investigation of the abdominal contents with the aid of mediate percussion, it will be necessary to attend to certain facts: — 1st, That the pleximeter will furnish, in the same person, a sound varying from dull to tympanitic as the parts over which it may be placed differ in density and the quantity of air they may enclose; 2d, That in situations of the abdomen where, owing to the quantity of air usually contained in the bowels, mediate percussion generally gives a tympanitic sound when the plate is placed lightly on the surface, it will give a much duller, or even a dead sound, when pressed inwards so as to displace the air from underneath it, and to approach nearer to some solid body, or to bring the parts nearer to that condition than the pressure; 3d, That the stomach and whole tract of the intestinal canal, always contain a certain quantity of air or gaseous fluid, particularly the large bowels; and that they approach more nearly to the abdominal parietes in proportion to their distension, whether with air, or with fluid or more or less solid contents; and, 4th, The quantity of air contained in the digestive tube, especially the stomach and large bowels, is great in proportion to the deficiency of its vital energy, and the degree of inflammatory action affecting it.

23. These facts being attended to in our investigation of abdominal diseases by means of percussion, mediate or direct, the extent of the

liver may be distinctly traced by its means, and the degree of inflation of the bowels, or stomach, may be ascertained with tolerable certainty. When the stomach is nearly empty (for it always contains some air secreted from its internal surface), it retracts backward, and recedes from the abdominal parietes towards the centre of the trunk, having then the colon, more or less distended with gas, placed before it. As it becomes filled with air or the ordinary ingesta it extends to the left hypochondrium, and approaches the left and anterior parietes of the upper zone of the abdomen. In proportion to the quantity of air it contains, percussion gives out a clear sound, which is dull as dead air is filled with fluid or solid ingesta, and as the air is displaced. When we know that the stomach must be empty of food, and yet find that a dull sound is emitted on percussion, we should always suspect organic disease. In these cases air is often secreted with great rapidity from its internal surface, but is immediately expelled, owing to the irritable state of its muscular coats, without being retained, and before any very material distension of the viscus is occasioned by it.

24. The small intestines generally contain air, although, I believe, much less than is usually found in the large bowels. In a state of health, particularly a few hours after a meal, when the chymous matter is passing along them, percussion over them—that is, over the umbilical region, and the immediately adjoining parts of the surrounding region—generally yields a dull sound, which becomes clear in proportion to the quantity of air they contain, excepting in very fat persons. In a great majority of abdominal disease, the quantity of air contained in the small intestines is increased much beyond what exists in health. This is particularly the case in several diseases of debility—as chlorosis, indigestion, colicky affections, torpid states of the liver, constipation, certain states of fever, hysteria, &c., and still more so in inflammatory states of portions of the digestive tube, in peritonitis, in puerperal fevers, &c.

25. When the mucous surface of the bowels or of the stomach is irritated or inflamed, the quantity of air secreted is often very great, but, excepting in the slightest states of such disease, it is seldom retained within the sphere of the inflammation so as to occasion that degree of distension which may be detected by percussion, although it is often retained in adjoining parts of the tube, occasioning distension, great pain, tormina, &c. This disposition to expel the morbid collection of air arises from the irritability of the muscular fibres of that part of the intestines, the mucous surface of which is in a state of irritation, the morbid action of these fibres propelling it either upwards or downward, where it may accumulate or be evacuated, but most commonly into the large bowels, or into the duodenum and stomach, where it may be detected by percussion. In diseases which paralyse the contractile actions of the muscular coats of the bowels, as the malignant puerperal peritonitis, the last stages of enteritis, rabies canina, and the advanced states of adynamic fever, the quantity of air which is secreted and accumulated in the whole digestive tube, and the consequent distension, are often enormous. The sound on percussion, in these cases, generally becomes quite tympanic long

before death, indicating the change, as well as the lost tone of the muscular coat of the canal.

26. The phenomena now noticed to occur in respect of the small intestines affect, in a still more marked manner, the large bowels, flatulent distension of these being readily traced by mediate, or even direct percussion, particularly in the course of the colon, even when the small intestines are comparatively free from it.

27. It is not merely the presence of accumulated air in the different parts of the digestive tube, and the important pathological and therapeutic indications to which the knowledge of this fact naturally leads, that render percussion of the abdomen a valuable means of investigation, but it is also the information it conveys of the existence of more solid formations—of fluid collections, and morbid productions. Unusual distension of the bladder, all the forms of abdominal dropsy, ovarian diseases, purulent collections in, or enlargements of, the liver, tumours of every kind, particularly when they reach a considerable size, enlargements of the spleen or kidneys, &c., are more readily and earlier detected by means of mediate percussion than without this aid and, in all these, the sound emitted is dead over the diseased part, and becomes clear as the boundary of disease is passed, and when the plate is placed over the hollow viscera.

28. IV. Auscultation, mediate or direct, particularly the former, is often necessary in abdominal diseases, particularly in ascertaining whether or not the large vessels are affected, and even in tracing disease of the right side of the heart and of the pericardium. It may also be useful in those diseases of the liver which extend to the lungs through the diaphragm, particularly abscess, or hydatidic cysts of the liver breaking into the lungs. Auscultation of the abdomen has been resorted to by M. KÉRARDY to ascertain the existence of pregnancy, and by M. LAFRANC, to determine the presence of stone in the bladder, when the sound is imperfectly heard to strike against it.

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ABORTION. ΣΥΝ. Abortus, abortus, affluxus.

Διαφθορά, ἐκτρώμα, ἐκτρωσμός, Αἰσὶς Ἀμβλωμα, ἐξαμβλωσις, ἱλιπ. Abortement, FF Aborto, Ital Ialche Geburt, Leihgebur, Ger. Miscarriage, Eng.

CLASSIF. 5 Class. Diseases of the Sexual Function, 3 Order, Affecting Impregnation (Good). I. CLASS, V. ORDER (Authg, see Preface).

1 DEFIN. The expulsion of an embryo or fetus which is either already dead, or is at a too early period of fetal existence to live.

2 This definition will distinguish abortion from premature labour, which latter is applicable to delivery after the sixth month, when the foetus may live; and from false delivery, which signifies the expulsion of a mole, or false germ instead of an embryo. Under this term I also include expulsion of the ovum before the sixth week, commonly called miscarriage.

3 CAUSES. These may be divided into such as act primarily upon the mother, or depend

upon her; and into those which are connected with the product of conception, and are owing to diseases of the fœtus and its appendages. (DUGES.) Or they may be divided into the predisposing, exciting, and efficient causes. It will be necessary to consider the causes with some relation to these distinctions.

4. *I. Predisposing causes.* The disposition to abortion is, in some females, so strong that the slightest exciting cause will produce it; in other females the most serious injuries, and the most violent mental and moral impressions, are insufficient to occasion it. Some of the predisposing causes are referable to the mother, others to the fœtus and its appendages.

5. *A. The predisposing causes referable to the mother* are numerous, and consist of certain states of the uterus, and particular conditions of the habit and constitution, influencing either the uterus or the embryo itself.

6. *The conditions of the uterus* favouring abortion are great rigidity of its fibres, and an unyielding state of its parietes, opposing too great a resistance to the dilatation which the organ must necessarily experience; too great sensibility and contractility of the uterus, in the former of which states the other organs of generation often also participate; too great a flow of blood to the uterus and ovaria, either proceeding constitutionally, or from causes which excite the nerves of these organs or parts adjoining; feebleness and relaxation of the neck of the uterus, — a condition of the parts which M. DESORMEAUX states he has frequently ascertained to exist in females subject to abortion; and atony of the uterus itself, either from original constitution or long-continued leucorrhœa, or from a severe or protracted labour, a cause which may be conjoined with the one preceding it. The foregoing causes are chiefly productive of those abortions which occur at the same period of pregnancy, and which have been called periodic by some authors.

7. To the above may be added, as strictly referable, a condition of the organ called by PÉRU immoderate heat of the uterus, which is attributable to an excited condition of the nerves of the organ, and a chronic inflammatory or irritative state of its vessels; also, scirrhus, fibrous, fleshy, steatomatous tumours of the uterus; polypus, dropsy, the presence of several children, and the too rapid or too great dilation of the organ thereby occasioned; tumours of, and fluid effusions into, the substance of the ovaria; and inflammation of the ovaria and parts adjoining.

8. *The causes chiefly referable to the constitution and habit of the mother* are certain states of the atmosphere, to which only can be attributed those frequent abortions sometimes observed, which have even assumed an epidemic form, and of which HIPPOCRATES, FISCHER, TRUSSER, DESORMEAUX, and others have made mention; the sanguine and irritable temperament; plethoric habit; a constitutional disposition to hæmorrhage independently of, or connected with, the foregoing states; habitual menorrhagia; irregular menstruation; great debility of body; excessive sensibility, susceptibility, and mobility of the nervous and muscular systems; hysterical states of the nervous system; the syphilitic and the mercurial poisons; a cachectic condition of the frame; painful and chronic diseases; addiction to masturb-

ation in early life; curvatures of the spine; malformations of the spine and pelvis; hereditary disposition; an acquired disposition arising from previous abortions caused by accidental circumstances; marriage or impregnation late in life; deficient or improper nourishment; too close cinctures of the body; worms in the intestinal canal; conception at a too early period after delivery, or after a previous abortion; the atonic state of plethora generated by luxurious indulgences, by sleeping in soft and too warm beds, by indolence, a too full diet, &c.; local plethora, or excitement of the uterine organs, occasioned and kept up by sensual gratifications; and the constitutional and local commotion occasioned by infectious, exanthematous, pestilential, and febrile diseases.

10. *B. The causes which depend upon the fœtus* are referable either to the fœtus itself or to its appendages. They operate either by favouring the death of the fœtus, which acts then as a foreign body in the uterus, exciting the organ to expel it; or by impeding its growth, so that it does not consume, or does not afford a ready circulation to, the blood sent to the uterus; thus occasioning an accumulation of this fluid in the uterine vessels, and consequently congestion, terminating in hæmorrhage and the expulsion of the embryo. Owing to these circumstances, abortion is favoured by debility, or imperfect development, of the fœtus; by monstrous conformation, a disease affecting it at some period of its early growth; by the imperfect adhesion of the placenta to the surface of the womb, or its implantation over the neck of the organ; by disease of the placenta, as inflammation, apoplectic hæmorrhage into its substance, calcareous deposits, fatty degeneration, scirrhus or cartilaginous induration; the formation of serous cysts, of hydatids, aneurism, or varices of this organ; by atrophy, hypertrophy, or disproportionate size of the placenta; by a too short or a too long umbilical cord; by twisting of the chord around the neck or one of the limbs of the fœtus; by diseased structure of the chord itself, as extreme density or softness, the formation of tumours or hydatids in it, by knots or adhesions preventing or impeding the circulation through it; great tenderness of the membranes of the ovum; inflammation, thickening, opacity, and irregularity of the membranes; the presence of too much or too little amniotic fluid, and collections of serum, or of a sanguineous fluid, between the chorion and amnios; adhesions formed between the placenta and parts of the surface of the fœtus; and, in the more advanced periods of gestation, constitutional diseases, particularly eruptive and infectious diseases, or continued fevers, extending from the mother to the embryo.

10. II. *The occasional exciting causes* are extremely numerous. It may be even said, that there is scarcely an occurrence in life which may not be occasionally concerned in producing abortion. (DESORMEAUX.) The chief causes of this class are acute diseases; such as fevers, scarlatina, measles, small-pox, and inflammations, particularly of the uterus, ovaria, pelvic peritoneum, colon, &c.; the irritation of adjoining viscera; diarrhœa, dysentery, tenesmus, colic, constipation, hæmorrhoids; hysterical and epileptic convulsions; syphilis; violent pain; disappointment and anxiety of mind; anger, fright, excessive joy;

the impression of various odours; threatened asphyxia, particularly from the vapour of carbon; violent exertions and fatigue; dancing; riding on horseback, or in an uneasy carriage, or on a roughly paved road; excessive venereal indulgence; severe cough; hiccup; immoderate laughter; vomitings; sea-sickness; injuries to the loins or abdomen; any sudden shock, even the extraction of a tooth; the use of irritating or drastic purgatives, or of emmenagogues; pediluvia; hot-baths; large blood-lettings, particularly from the feet; convulsive movements of the fœtus; rupture of the umbilical cord or of the membranes; adhesions formed between the serous surface of the fundus of the uterus and the adjoining viscera, preventing the dilatation or the ascent of the womb, and occasioning its reaction on its contents.

11. The foregoing causes act variously in producing abortion. Some of them may produce directly a separation of the placenta from the surface of the uterus, particularly when the placental mass is very considerable; but this is a rare occurrence, and can only be inferred to exist when uterine hæmorrhage follows immediately upon the application of the exciting cause. A violent shock, injury, fall, compression of the uterine region, riding, dancing, coition, &c. may have the immediate effect, or they may occasion rupture of the cord or of the membranes; but more frequently these, and, in a still more particular manner, the other exciting causes, produce certain intermediate effects, as congestion of the vessels of the womb, which is soon followed by hæmorrhage and by separation of the placenta; or they occasion contractions of the uterus, owing to the excitement and irritation of its nerves, or of the nerves of adjoining or sympathising parts, the separation of the placenta, and expulsion of the fœtus.

12. KLFIN and many other authors have remarked that the causes of abortion generally have a more marked effect at the period at which the menses would have returned in the unimpregnated state. The *molimen*, or tendency to congestion in, and hæmorrhage from, the uterus, which then may be supposed to exist, renders it more susceptible of being injuriously impressed by the occasional causes of the disease; and, where other predisposing causes are already in existence, has a direct influence in separating the placenta, and inducing uterine contraction and abortion: several of the causes produce spasmodic or convulsive actions, which are sympathetically transmitted to the uterus, whilst others seem to act primarily on the fœtus. The direct action of certain of the exciting causes on the fœtus may be doubted; but every experienced and observing practitioner must have remarked the very frequent and immediate effect of strong passions of the mind of the mother upon the motions of the fœtus, inducing convulsive actions, painfully and distinctly felt, and sometimes followed by its death. Amongst the most common exciting causes of abortion, are those means which, from their occasional action in this way, have been called *abortives*, and which the practitioner should be acquainted with, so as to enable him the better to counteract their effects.

13. The production of abortion is a felonious act, and one which the practitioner never will

resort to, except in the case of irreducible retroversion of the uterus. The means usually resorted to by females themselves, or by persons who criminally usurp the medical character, and employ feloniously the little empirical knowledge they may have acquired, either surreptitiously or otherwise, are, large bleeding from the feet; pediluvia; violent emetics; drastic purgatives, particularly those which act upon the colon and rectum; active emmenagogues, as savine, ergot of rye, juniper, hellebore, &c.; and stimulating injections into the vagina: also various mechanical means employed to break the membranes, or to procure the discharge of the amniotic fluid. Many of the foregoing, or all of them excepting the last, will often fail of producing the desired effect. They frequently also succeed, and sometimes they occasion the death of both mother and fœtus. MAURICEAU, DE LA MOITE, BOER, DESORMEAUX, DUGES, BURNS, HAMMON, RYAN, &c. have satisfactorily shown the uncertainty of those means, and have met with numerous instances in which they had been carried to the utmost extent without acting in the way desired; but had occasioned enteritis, dysentery, peritonitis, metritis, and other dangerous diseases. Many cases are also on record where attempts had been made to produce abortion by puncturing the membranes; and the uterus itself had been penetrated, and the death of the mother thereby occasioned. It is a matter of the utmost difficulty, even to the most expert surgeon, to puncture the membranes at that period of pregnancy when it is usually attempted by ignorant persons; the only persons, indeed, who would make the attempt.

14. THE SYMPTOMS of abortion vary remarkably with the period of pregnancy at which it takes place: also with the cause producing it. They do not, therefore, admit of being divided into precursory and essential symptoms: the former being frequently wanting. In the two first months of pregnancy the ovum, which is then small, is sometimes expelled without any remarkable pain or hæmorrhage; but more frequently there are pains, accompanied with coagula, in which the ovum is generally enveloped, and where it often escapes observation. This is particularly the case when the membranes being broken, the embryo escapes without the placenta. At this early period females often suppose that they have been the subject merely of an interruption of the menses, followed by a more abundant and painful return of them than usual, instead of a true abortion, or miscarriage.

15. As the period of utero-gestation advances, and the size of the fœtus increases, the pains and hæmorrhage accompanying abortion are augmented; the hæmorrhage being generally more considerable than that attending delivery at the regular period.

The abortions which proceed from chronic diseases, or from causes acting slowly, and particularly those which are occasioned by morbid states of the embryo, or of its membranes, are generally preceded by horripilations or rigors, followed by febrile movements, by heat, want of appetite, nausea, thirst, pain in the loins, lassitude, leipothymia, syncope, coldness of the extremities, palpitations, lowness of the spirits, paleness of countenance, tumefaction or lividity of the eyelids, deficient brightness of the eyes, &c. of the

breath; a feeling of weakness in the abdomen, or of cold about the pubis; of weight about the anus and vagina; flaccidity and diminished size of the breasts, sometimes with a slight discharge of serum; a flow of a sanious, then of a sanguineous fluid; and afterwards of blood, either in a fluid or grumous state, from the vulva; diminished motion of the child, soon afterwards followed by perfect cessation of motion; lessened bulk of the abdomen or of the hypogastrium; uterine pains, which become more and more frequent and severe; progressive dilation of the uterine orifice, and prominence of the membranes; and, lastly, expulsion of the amniotic fluid and fœtus, followed, at an indefinite time, by the placenta. Most frequently the discharge of blood does not cease until the placenta is expelled. (DESORMEAUX.)

16. Abortion proceeding from the more energetic exciting causes is sometimes preceded by pains, and an unusual sense of weight in the loins; and at the lower part of the vagina by horripilations or rigors, by general uneasiness, and cardialgia or nausea. From the first there is often an appearance of blood, followed by the discharge of a sanguineous serum, which soon passes into serious hæmorrhage. In other cases the action of the cause is instantly followed by a large effusion of blood, which continues until after the expulsion of the fœtus and its appendages. Frequent lancinating pains dart through the abdomen, chiefly in the direction of the umbilicus and vulva: the uterus makes efforts at expulsion, and the fœtus is expelled. The more advanced the term of pregnancy, the nearer do the symptoms approach to those of delivery at the full time; and the nearer also do its consequences assimilate to those following upon a natural confinement, as the lochial discharge, after pains, milk-fever, &c.

17. It is sometimes observed, even up to the middle period of utero-gestation, that the fœtus is expelled enveloped in its membranes. But it sometimes also occurs in the first months, that, after the rupture of the membranes, the fœtus and placenta are retained, decomposed, and discharged in the form of a brown fetid sanies. In other cases the placenta is not expelled until several weeks after the fœtus, either in the state now described, or in that of a putrid mass. It occasionally is observed that the placenta continues attached to the uterus, and is nourished, increasing in size; and assuming the appearance of a fleshy mass, in which are sometimes found simple cysts, or cysts containing hydatids. This latter occurrence takes place either when the fœtus had been expelled, or had died at an early period of its formation; and, whilst it was yet small and nearly gelatinous, being dissolved during the process of decay in the amniotic fluid, or preserved in it.

18. This change in the placenta forms what has been called by DESORMEAUX and others the *mole of generation*; the chief character of which is that it possesses a cavity lined with a smooth membrane, the remains of the amnion. Frequently, at the more advanced periods at which abortion takes place, the fœtus is expelled alive; but the duration of its life subsequently depends upon its age, and the circumstances attending its abortion. It sometimes also is dead before it is expelled, occasionally for a considerable time; al-

though it may have reached the age of several months. Its death does not necessarily lead, although it does generally, to its expulsion. In some cases it is retained even up to the full period of utero-gestation, and is then thrown out in a state of peculiar softening and maceration, but without putrefaction; this only occurs when the membranes have remained entire, and air been excluded from the interior of the uterus. In other instances it is converted into a substance resembling adipocere, or the fatty substance generated during the decomposition of animal matter. In rarer cases the fœtus and envelopes become hardened, and even converted into a bony or petrous state, and retained till the natural death of the mother; or, in the course of some months, or even years, occasion inflammation of the uterus, and suppuration. Sometimes, in cases of this latter description, a portion of the uterus forms adhesions to the parts opposite; the abscess which is formed extending in that direction, and opening on the surface of the abdomen, or in the interior of the intestinal canal, or into the vagina, and giving issue to purulent matter, mixed with a fetid sanies, and portions of bones arising from the decomposition of the textures of the embryo. But these latter consequences of abortion are rarely met with unless in cases of rupture of the womb, or extra-uterine impregnation.

19. In some cases of abortion the hæmorrhage from the uterus continues to a serious extent for several days. This may be the case at various epochs of pregnancy; and may result from the detachment, partial or general, of the placenta, and its retention along with the fœtus in the uterine cavity, owing to imperfect action of the uterus to eject it. It may also proceed from the expulsion of the fœtus, and the retention of the placenta, either altogether or partly separated from the uterus. In some cases the presence of the placenta, or of a portion of the membranes in the womb, or in the os uteri and upper part of the vagina, by the irritation thereby occasioned, may have the effect of keeping up a constant and exhausting hæmorrhage. In a case of abortion to which I was recently called, the practitioner in attendance stated the fœtus to have come away two or three days previously. Upon enquiring as to the discharge of the appendages, I was led to recommend an examination *per vaginam*; when they were found lodged partly in the vagina and os uteri. After their removal the patient rapidly recovered.

20. DIAGNOSIS. The diagnosis of abortion should be directed to three objects: 1st, its cause; 2dly, to the possibility of preventing its occurrence; and 3dly, to ascertaining the stage or development of the process. The causes of abortion are generally readily recognised, and admit of an easy explanation. There are two, however, to which Professor DESORMEAUX has particularly directed attention; namely, rigidity of the fibres of the fundus and body of the uterus, and laxity of its neck. The former of those is generally connected with a similar state of the whole system, and accompanied with scanty or painful menstruation. In the first impregnations abortion takes place at an early period; but in subsequent impregnations the period of gestation approaches more nearly the natural epoch, the female at last bearing children to the full time.

When the abortion is referable chiefly to laxity of the neck of the uterus, a result contrary to the foregoing takes place; the period of abortion approaching nearer, in successive conceptions, to the time of impregnation. Examination per vaginam discloses the state of the cervix uteri, which sometimes permits the escape of the ovum without much pain. The presumed existence of either of the foregoing states, particularly if any of the symptoms enumerated as characterising abortion be present, should lead us to suspect its approaching occurrence. And it may be considered as commenced if pains occur at regular intervals, which become of shorter duration, and are directed from the umbilicus to the os coccygis; if the os uteri dilates, if the membranes become prominent during the pains, and if the anæsthetic fluid escape. M. DESORMEAUX, however, has detailed instances where, notwithstanding the above phenomena, the patient was not delivered for several weeks afterwards; but these are extremely rare.

21. In cases where more than one child is contained in the uterus, or where this organ is double, one of the fetuses may be expelled in the course of gestation, and the other may still remain and arrive at the full period of foetal life. The eminent author whom I have now quoted mentions the case of a female, pregnant for the first time at the age of forty years, who experienced abortion at two months and a half: the symptoms of pregnancy, however, continued, and the motions of the fetus were felt at the usual time. At the seventh month, a severe fright was immediately followed by symptoms indicating the death of the child; however, the motions of the child were still felt in the uterus: at last, after two months, and at the usual period of gestation, this female was delivered of a dead child, and of another which had arrived at the full period, and was living and healthy. M. ROUSSEAU has also related a similar case (*Traité de l'Hystérotomie*). When abortion occurs during the first two months, we can often only distinguish it from excessive menstruation by the coagulating of the blood. Cases, however, sometimes are met with where coagula form during menstruation, but seldom or never during healthy menstruation. Abortion is most frequent during the three first months of pregnancy.

22. **PROGNOSIS.** Abortion has been considered of more serious import than delivery at the full time, by HIPPOCRATES, ÆTIUS, MAURICEAU, and others. The prognosis will, however, entirely depend upon the nature of the causes producing abortion; the period of gestation at which it takes place; and the symptoms accompanying it. It may be stated generally, that the danger increases in proportion as it approaches the full period of gestation; inasmuch as the hæmorrhage is greater, the expulsion of the fetus and appendages more difficult, and the milk-fever more violent, the longer the period of utero-gestation. The abortion which occurs from accidental, or active exciting causes, is generally more dangerous than that which follows the predisposing causes; this is more particularly the case, the more violent the cause, the more prompt its effects, and when it acts upon females not predisposed to abortion. The most dangerous abortions are those which are procured by substances

of an irritating nature taken internally, and by attempts to excite the uterus, or to puncture the membranes per vaginam.

23. On the other hand, when abortion takes place spontaneously, and without any very manifest or sufficient cause, it is often unattended by pain or difficulty, leaving behind it scarcely any unpleasant consequences: but this form of abortion is most liable to recur; and its repeated occurrence often gives origin to a number of ailments, some of them of serious moment, such as irregular menstruation, chronic metritis, organic lesions of the uterus and ovaria, irritable uterus, hysteria, and a debilitated and cachectic habit of body.

24. Abortion is chiefly dangerous from the hæmorrhage attending it, and hence the risk is proportionate to the extent of this effusion. Abortion, accompanied by convulsions, diarrhoea, dysentery, or supervening in the course of fevers, inflammations, or of eruptive diseases, are seldom devoid of danger, which, under certain circumstances, is even great. Inflammation of the womb of great severity, endangering the life of the patient, or causing adhesions of the Fallopian tubes or of the ovaria to the serous surface of the uterus, and consequent sterility, is not an unfrequent consequence of abortion.

25. On the other hand, it may be productive of certain advantages, according to MAURICEAU, DESORMEAUX, and some others, who have, in rare cases, observed abortion occurring before the third month to be followed by a more regular state of the catamenia, in those who had been irregular previously, and by an improved state of health; even fecundity taking the place of former sterility.

26. **TREATMENT.** The treatment of abortion is divided into, 1st, the preservative; 2d, the palliative; and, 3d, the remedial. On each of these I shall offer a few remarks.

1. The Preservative treatment comprises the following objects; viz. to remove the predisposing causes as far as this may be accomplished; to repress all undue action wherever it may appear; and to prevent, as well as to counteract, the effects of the exciting causes. These ends are to be kept in view, and applied to individual cases, appropriately to the causes and circumstances by which they are characterised. Where plethora, general or local, exists, it should be reduced by general or local depletion, in very moderate quantity, and repeated at short intervals; but more preferably by a low and antiphlogistic diet and regimen, acidulous and cooling beverages, the recumbent posture, and tranquillity of mind. In cases characterised by relaxation of the system, and of the reproductive organs, an opposite, or a tonic and invigorating, regimen is required. In every instance the preservative treatment must be based upon our views respecting the pathological state of the uterus, and of the whole frame at the time of prescribing it.

27. When the horizontal posture is considered necessary, the patient will be more benefited by reclining on a mattress, than on a soft, hot bed. Her apartment should be cheerful, large, and airy; the bed-clothes light; and all anxiety of mind respecting the issue, and depression of spirits, prevented; a confiding and cheerful state of feeling will materially conduce to a favourable result

The diet, under ordinary circumstances, ought to be light and digestible, and varied according to the particular circumstances of the case. The beverage should be mild, and, in cases of local or general plethora or excitement, rather cooling than otherwise, and such as may promote, rather than retard, the natural actions of the bowels. Lemonade, imperial, barley-water, toast-water, &c., are amongst the best in this class of cases.

28. Much will depend upon the perseverance with which this plan may be followed, particularly in cases of habitual or precedent abortions; where it ought to be rigorously enforced and continued for months, or, at least, for a long time after the period of gestation at which the former abortion occurred. If the threatened abortion be accompanied with pains, or by any degree of discharge, an opiate should be given at bed-time; and, in every case where we have conceived it requisite to abstract blood, either generally or locally, even as a preventive measure, the operation should be followed by a dose of opium.

29. Attention to the bowels is indispensable; but great discrimination is necessary in the choice of laxatives when the bowels are constipated. These should be of the most cooling and gentle description. The soluble tartar, and cream of tartar in the form of electuary, or with confection of senna, particularly in cases of plethora, are very eligible. Castor oil, with a very few drops of laudanum, which will not retard its operation; or small doses of the super-sulphate of potash, are also suitable laxatives.

30. When, from our knowledge of the state of the ovum, in previous abortion, we suspect a repetition of it, we may endeavour to prevent it, by using those means which are most successful in imparting energy to the constitution, and, through it, to the generative functions; so that the process of fœtation may proceed to a successful issue. This is, perhaps, best accomplished by change of air; the use of the tonic mineral waters, both internally and in the form of baths; by the mineral acids given in the infusions of bitter tonics, or with the solutions of the salts of iron: as the tinct. ferri muratis; the tinctura ferri æthereæ (see Appendix); by the sulphate of zinc, with the compound infusion of roses; by the exhibition of the various balsamic and terebinthinate medicines, combined with the pulvis cinchonæ, or the pulvis rhei, and the subcarbonate of the alkalis, or magnesia; and by attention to the state of the bowels, to diet, and gentle but regular exercise. The balsams most serviceable in cases of this description, as well as in all those characterised by weak and imperfect uterine function, are the balsams of Peru, of Canada, of Chio, and of Copaiba; the terebinthina vulgaris, and T. Veneta. Siebold recommends the balsamum vitæ Hoffmanni (F. 317.), a medicine which enjoys great reputation on the Continent in many diseases of debility. The loins may be rubbed night and morning, for some time, with the linimentum saponis et camphoræ comp. (F. 306.), the linimentum terebinthinæ compositum (F. 311.), or the liniment. anodynum (F. 298.). The application of the emplastrum camini, the emplastrum picis compositum, or the emplastrum roborans (F. 118.), to the loins will also prove of service.

31. When diarrhoea occurs during the period of utero-gestation, and more especially if it be

accompanied with tenesmus, in delicate females, or in those who have experienced previous abortions, it should be immediately checked or lessened. In these cases disorder is chiefly confined to the colon and rectum, which should be soothed by small emollient and anodyne enemata, or by the use of suppositories of lead plaster, and opium. Whilst, however, we thus prevent the irritation from being extended from the large bowels to the uterus, we should take care to prevent the retention of hardened faeces in the cells of the colon, by which irritation will be perpetuated; and to remove them, when we suspect their presence, by the use of gentle laxatives, and emollient and aperient injections, avoiding the use of saline purgatives and cathartics.

32. In cases of threatened abortion in debilitated constitutions, the mineral acids, particularly the sulphuric, either with or without small doses of laudanum, or combined with small doses of colchicum, or of digitalis, are extremely useful. Where the circumstances of the case permit the horizontal posture to be dispensed with, the patient may be allowed very gentle exercise, for short periods, in the open air, avoiding all exertion and local excitement. She should live abstemiously, yet not too low. In many cases of this description a glass or two of light wine may be allowed daily, and in several a still more tonic treatment is required. When this is the case, the infusion of calumba, or of quassia, with the carbonate of soda, and tincture of hyoscyamus, has seemed to me very serviceable; and the patient has been allowed the occasional use of the swing, or a gentle ride in a carriage. The tepid and cold hip-bath, particularly with sea-water, are often of use in cases of this description, as well as the treatment recommended in a preceding paragraph. The necessity of abstaining from sexual intercourse, in all cases of threatened abortion, is most evident.

33. In cases accompanied with incipient discharge, either the cold hip-bath, or sponging the hips, thighs, and lower parts of the trunk with cold water and vinegar; or by squeezing a large sponge filled with cold water, so that its contents may fall in a scattered stream from some height upon the hips and pelvis; will sometimes be serviceable. Injections of cold or iced water, or cold astringent solutions per vaginam, or a lavement of cold water, will sometimes arrest the accession of hæmorrhage.

34. It will occasionally be observed that weak, nervous, and delicate females are often irritable and dispirited from a tedious confinement, during gestation, and even aborting to this cause; obviously, in many cases, from the effect produced upon the uterus, and upon the nutrition and health of the embryo. This should be anticipated, and prevented by a timely relaxation of the plan, and by allowing the patient as much exercise, amusement, &c., and by adopting as much of the treatment recommended above (§ 32.), as may be consistent with the accomplishment of our end. When, in these cases, the nervous symptoms predominate, the use of antispasmodics, with anodynes, and their combination with vegetable bitters, chalybeates, &c., are often required. The diet should also be nutritious, but easy of digestion, and not too heating and stimulating.

35. The foregoing plan will often succeed in

preserving the infant, unless the discharge continues or becomes more copious; the uterine pains, with the other symptoms of commencing abortion, still persist or increase; and the woman be advanced in pregnancy; when little advantage will be obtained, particularly if the orifice of the womb dilate. When this is the case, attempts at preservation will entirely fail, and we must adopt the second intention.

36. II. The palliative measures now required consist, in addition to those recommended (§ 33.), of cold applications to the genital fissure and insides of the thighs, and the *tampon*, or plug, as recommended by a number of authors, and sanctioned by DENMAN, HAMILTON, BURNS, MERRIMAN, DEWEES, RYAN, &c. These are especially requisite where the hæmorrhage is great, particularly when the abortion takes place between the third and sixth month. Opium, with the superacetate of lead, given in a very large dose at the first, and repeated according to circumstances, should also be exhibited. Opium, as well as plugging the vagina, are chiefly serviceable where the hæmorrhage continues after the expulsion of the embryo. The plug recommended by Dr. DEWEES is a sponge squeezed out of vinegar. Dr. RYAN advises either old linen or a sponge to be wetted with a saturated solution of alum, and smeared with some oleaginous matter, to be passed up the vagina, so as completely to fill it. Dr. BLUNT directs a scruple of alum, dissolved in a pint of water, to be injected into the uterine cavity.

37. The practitioner should in every instance be satisfied as to the expulsion of the embryo and the whole of its appendages, for he may be deceived in this matter (§ 19.); a small remnant of the placenta or of the membranes, when still left in the cavity of the uterus, or even lodged in its orifice, being often sufficient to keep up an exhausting, or even dangerous discharge. When the embryo only is expelled, the appendages being still retained, or when the hæmorrhage is great, the entire ovum still remaining in the uterus, the ergot of rye will often prove of inestimable service: and when given in the form of decoction, with as much borax as it will dissolve, will seldom disappoint our expectations. When a portion of the appendages remain at the orifice of the womb, it may be drawn down by the finger, or by a curved dissecting forceps. In cases of great hæmorrhage in the early months of pregnancy, the ovum being retained, Dr. BURNS advises the use of smart clysters, and plugging the vagina. In every case of hæmorrhage from abortion, as well as after delivery at the full period, but particularly when the hæmorrhage proceeds from inefficient contraction of the uterus and retention of the ovum, or some portion of the appendages of the embryo, I have prescribed, with complete success, an enema, with from one to two ounces of the oleum stercorinum in a pint of water-gruel.

38. The injection of water into the rectum, or a solution of acetate of lead and opium, has been advised by Dr. DEWEES and Dr. CONQUEST. When the hæmorrhage occurs in robust and plethoric females, and the discharge has not produced much exhaustion, venæsection may be tried. In cases of this description, digitalis, in half-drachm doses, has been recommended: but, owing to the loss of blood, the effect, although not

produced with the necessary celerity, will often be too violent and unmanageable, and will so endanger the patient as not to justify its use unless under very peculiar circumstances. I once prescribed colchicum in large doses in a case of hæmoptysis, with violent paroxysms of cough and threatened abortion, occurring in a plethoric lady at the fourth month of pregnancy. Full venæsection was performed, chiefly on account of the severity of the pulmonary disease; the colchicum was directed with an anodyne; and the patient left under the care of the family practitioner. Abortion took place, and was attributed chiefly to the sickness, retching, and depression occasioned by the colchicum; it having been remittingly administered until my next visit, on the third day from that on which it had been prescribed, notwithstanding the discretionary power with which the practitioner had been invested. (See also, on this subject, the *Treatment of Hæmorrhage from the Uterus*.)

39. III. The remedial treatment of abortions is next to be considered. It occasionally happens that the retention of the ovum, or of a portion of the appendages of the embryo, produces much constitutional disturbance, particularly nervous symptoms and irritative fever, which sometimes assume serious features, with disorder of the bowels, typhoid or ataxic signs, and an offensive vaginal discharge. The decoction of cinchona and muriatic acid, or this decoction with the liquor of the acetate of ammonia, or the following, will prove extremely serviceable:—

No. 1. R. Miste. Camphoræ ʒj; Liq. Ammon. Acet. ʒijss; Acidi Acetici Pyroglicæ Mxxv; Syrup. Zingiberis ʒss. M. Fiat haustus ter quaterve in die sumendus.
No. 2. R. Camphoræ rasæ, gr. ij.—iiij; Extr. Cinchon. Resin. gr. iij.—v; Conserv. Ros. q. s. ut fiat Pulvis ij, ter die capiendo.

In cases of this description a turpentine enema, administered every second or third day, is extremely beneficial: and advantage will be derived from injections of a solution of the chloruret of lime, or of Labarraque's liquor, *per vaginam*.

No. 3. R. Liq. Labarraquii Chloro-Sod. ʒjss; Mist. Camphoræ, ʒijss. M. Fiat injectio.

40. When troublesome diarrhœa is present, in cases of this description, the chloruret of lime, either in the form of pill or solution, is extremely efficacious. I have prescribed it as follows:—

No. 4. R. Chloruret. Calcis gr. viij.—xvij; Pulv. Tragacanth. Comp. ʒjss; Syrup. q. s. M. Fiat Pulvis xxiv, quatum capiat bina ter quaterve in die.

No. 5. R. Chloruret. Calcis gr. v.—xij; Tinct. Calumbei ʒij; Aq. Ment. Virid. vel Aq. Carul. vel Aq. Anethi, ʒvj.—3 vijsa. Fiat Mist., cuius sumat coch. i. vel ij, larga ter quaterve quotidie.

The chloruret of lime may also be administered in water gruel, as an enema, in doses of viij, to xij grains, once or twice daily.

41. The debility occasioned by abortions requires the use of tonics, with mineral acids, nourishing but light diet, a wholesome air, gentle exercise, and the tepid or cold salt-water bath:—the mineral waters of Bath, Barèges, or Tunbridge; those of Ems, Spa, Pyrmont, and Gellnau; or the artificial mineral waters of the last-named places, are also beneficial. When nervous or hysterical symptoms supervene, the exhibition of antispasmodics, with gentle tonics, and the occasional use of cooling aperients, are required. The treatment of the effects of abortion is, in every respect, the same as that recommended in

the articles on *Hæmorrhage* from the *Uterus*, in the unimpregnated and puerperal states.

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ABSCESS. SYN. *Abcessus* (from *abscedere*, to depart, to separate), *Apostema*, *Abcessio*, *Vomica*, *Imposthuma*, Auct. Lat. *Ἀποστήμα*, Gr. *Abcès*, Fr. *Die Eiterbeule*, Ger. *Edderbyld*, Dan. *Bulning*, Swed. *Eitergevel*, Dut. *Assceso*, Ital. *Abcesso*, Span. *Abcesso*, Port. *Abcess*, *Imposthume*, Eng.

• CLASSIF. — See INFLAMMATION.

1. DEFIN. A collection of purulent matter formed or deposited in the structure of an organ or part.

2. An abscess is never an original disease, but is constantly the effect or termination of inflammatory action, in some form or grade, or of irritation of the part in which it is seated. This may not seem to be in accordance with certain phenomena connected with the formation of purulent collections, in parts at a distance from those in which inflammatory action originates, and where pus is originally formed; but I shall have occasion to show that it is not opposed to sound views as to this topic, or, at least, that the exceptions to it are few.

3. Without noticing further than to enumerate them, the older distinctions of abscesses into the warm, phlegmonous, or inflammatory, the cold or congestive, and the acute and the chronic, I shall have to show that, instead of proceeding from different sources, they are equally the result of a certain state of inflammatory action, modified into a variety of forms according to the degrees of vital energy and action of the part, and of the system generally, the organisation of the part affected, and the peculiarity of constitution and diathesis. In the present article, a general view will be taken of the pathology and medical treatment of abscess, the consideration of the different kinds of abscess; their various seats, and relations to other diseases, fall under different heads, where they are more advantageously discussed.

4. I. OF THE PATHOLOGICAL CHARACTERS OF ABSCESS. 1st, Of abscess proceeding from acute inflammation, with integrity of the constitutional energy. When a part becomes inflamed, the vitality of which has not been previously injured, as respects either its individual state or constitutional relations, its temperature becomes increased, and its vessels are injected with a greater quantity of the circulating fluid than in health, and generally in proportion to the violence of the irritation

which this afflux of fluid depends. At first

the fluid does not extend beyond the vessels in which it has passed: but, in proportion as it distends them so as to exhaust their tone and power of reaction, and as the vital cohesion of their extremities, and of the tissues which they supply, is weakened, a portion of the more fluid constituents of their contents escapes into the texture of the part affected; infiltrates, and combines with its constituent elements; and renders it, at first, more compact and dense. But, at the same time that the inflamed part undergoes this change, it loses its vital elasticity, is more friable or lacerable, so as to break down more readily from foreign pressure, or upon the application of a firm ligature.

5. If the inflammatory action stops not here, the tissues affected by it undergo further changes. They pass, more or less rapidly, from a dense but friable state to that of softening; and this quickly but insensibly assumes a pulpy condition, owing to its continued and increasing infiltration with the more fluid parts of the blood, and even with more or less of its colouring particles; the molecules composing the tissues of the part being so combined with, and separated by, the infiltrated fluid, that all distinct traces of proper organisation are lost. From this pulpy state, to which the central portion of the inflamed structure is reduced, the transition to pus proceeds rapidly. But it is not to be understood that the tissues themselves are converted into this fluid. The fluid poured out from the extreme capillaries gradually distends the surrounding parts, and partially dissolves the softened and disorganised tissues in which it is effused. The coagulable lymph, which the tonic or unexhausted vital energy of the adjoining vessels form in the surrounding texture, confines the effused fluid, and prevents it from extending beyond the barrier it opposes; whilst the impaction of the cellular tissue, occasioned by the increasing quantity of purulent effusion, and the pressure it produces in all directions, with the thickening, and the continued deposition of lymph in the parietes of the abscess, tend still further to fulfil this end, and thus to limit the mischief, and to prevent the contamination and disorganisation of the adjoining structures; consequences which not unfrequently supervene, when the vital energies of the frame and the state of local action are insufficient to admit of the formation of coagulable lymph, and to throw up this barrier against the extension of disease.

6. The first step of the suppurative process is the dissemination, particularly in the softest, in the first and most intensely inflamed part, of minute collections of a sero-albuminous or sero-sanguineous matter. By degrees, this fluid becomes more abundant. These minute collections enlarge, approach each other, and, at last, the partitions of softened tissue between them are altogether disorganised and disappear; the whole, at last, forming only one cavity of variable extent. As this process advances, the effused fluid changes from a thin albuminous lymph into pus; which becomes more thoroughly elaborated, losing its colouring matter which it had derived from the blood, and dissolving the shreds or debris of the disorganised tissues in which it had formed: and when the suppurative process is matured, the pus forms an homogeneous fluid, presenting certain characters distinguishing it from all other animal fluids,

7. *Pus*, taken from a matured abscess of the description now exhibited, is generally a whitish or cream-like fluid; friable, homogeneous, soft, and smooth to the touch; somewhat heavier than water, in which it is only partially soluble; without any disagreeable smell, and producing of itself no irritating effects upon the tissues enclosing it as long as it is excluded from the action of the atmosphere. Upon a closer examination, it is found to consist of minute colourless globules, resembling the colourless globules found in the blood, floating in a thin albuminous fluid.

8. It is often a matter of importance to distinguish *pus* from the *mucus* secreted by a mucous membrane in a state of irritation; and, accordingly, various attempts have been made to establish some specific character. The circumstance of *pus* sinking in and partially mixing with water, whilst *mucus* remains at its surface, has been taken as a common test; and in many cases will be sufficient, with the history of the disease, and various concomitant phenomena, to enable us to decide: but it should be recollected that the *mucus*, which is frequently secreted in great abundance by the internal surface of the bladder, and which is very remote from *pus* in its characters, always sinks in water. Besides, mucous surfaces, when in a state of inflammation, secrete a fluid varying from a thin watery or frothy matter; and in some cases, from a thick albuminous and viscous mucus to a friable cream-like *pus*: but most commonly, a muco-purulent liquid, which presents more or less of the characters of both *pus* and *mucus*. The appearance exhibited by *pus*, when pressed between two plates of glass, which are afterwards separated, is often distinctive: this fluid attaching itself to their surfaces, without the viscous adhesion of *mucus*, and partly consisting of small globules. The viscous elasticity of *mucus*, of which character *pus* is entirely deprived, distinguishes the one from the other more completely, and in a more intelligible manner, to the practised eye, than any other feature they present. In addition, however, to this, it may be added that, when water is added to a solution of *pus* in dilute sulphuric acid, a more or less abundant precipitate is formed; whilst, with a solution of *mucus* in the same acid, whitish filaments form on the surface upon the addition of water.

9. As the partitions of softened tissue placed between the incipient purulent collections, in a part undergoing the early process of suppuration, lose their vitality, and become broken down in the effused fluid, the vessels and nerves, as well as the more solid tissues passing through the part, continue to resist the disorganising process for a longer period, so as to form isolated bridges, and communications between the separated parietes of the abscess.

10. The interior of the *parietes* of the cavity is generally more or less reddened, tomentous, and very close in its texture, owing to the impaction or distending power exercised by the accumulated fluid and the effusion of lymph; so that the fluid contained by them is completely isolated from the surrounding structures. The *membrane* thus formed presents all the characters of a mucous surface, particularly when the greyish pellicle which usually covers it is removed. Its interior surface is in contact with the purulent collection; whilst, externally, it adheres intimately to the

surrounding tissues, and is confounded insensibly with them. It approaches more nearly to the circumference of the inflamed part, the more complete the softening of the tissues, and the more the abscess has advanced to maturity. Its density and thickness are generally in proportion to the slowness of its formation and the length of time it has existed.

11. In parts abundantly supplied with cellular tissue, the membrane proper to abscesses acquires a great degree of resistance and density, forming thick *cysts*; whilst in very soft organs, or in those but scantily provided with cellular tissue, as in the brain, it remains long in the state of a vascular pellicle, scarcely distinct from the healthy structure with which it is connected. It is in general rare that we find a thick or firm *cyst* in the acute abscess now under consideration; for it forms too rapidly to admit of the thickening and condensation usually occasioned by inflammatory action of some duration. In some very acute abscesses, as in those which sometimes form in the liver of Europeans residing in India, after intense inflammation of the internal structure of the organ, no *cyst*, membrane, or even pellicle can be detected on the internal parietes of the abscess; the whole surrounding structure being inflamed, softened, and sometimes portions of it hanging or floating in shreds in the midst of the purulent collection. In these cases the purulent collection, although existing as a circumscribed abscess, more nearly approaches the diffused abscess next to be noticed.

12. The functions of the membrane lining abscesses are not confined to the containing and isolating the purulent matter, so as to prevent the contamination of the adjoining structures. Owing to the absorption and exhalation proceeding in its surface, the contained fluid is continually renewed, its qualities are modified, and its decomposition prevented. It is not altogether removed from the influence of life, but participates in the vitality of the surrounding textures, as all fluids accumulated in organised parts do, though in a feeble and obscure degree. M. ДУРОВИЧ remarks, that it is through the medium of this living envelope that the matter contained in abscesses is augmented and diminished in quantity; is thickened, or rendered more fluid; or is occasionally changed by substances absorbed or injected into the circulation. It is because the *cysts* of abscesses are connected by an intimate sympathy with the chief centres of vitality that the excitation of the more important viscera affects them in so marked a manner; and that remedies judiciously applied to these viscera, often tend to promote the absorption of the matter they contain.

13. 2d. *Of Abscesses proceeding from acute inflammation, in a cachectic habit of body, deficient vital resistance, and with a tendency to spread; or Diffuse Abscess.* In debilitated and vitiated habits of body; in persons of exhausted vital energy, whose assimilating and secreting organs are torpid; and owing to the operation of certain noxious and intense causes, particularly those which contaminate the structure to which they are applied, as various animal poisons, animal and vegetable matter in a state of decomposition, or whatever produces, from its local or constitutional action, a septic effect upon the living textures: from these circumstances especially, inflammatory action is

not limited to a particular part, or within distinct bounds; and the fluid which is poured out from the inflamed vessels is not circumscribed, or confined to the centre of the inflamed part. The inflammation which produces this unhealthy and imperfect form of abscess is always characterised by that state of asthenic or ataxic action, local and general, which is incapable of producing coagulable lymph from the blood, that may limit both the morbid action and the effused fluid. (See art. INFLAMMATION.)

14. The present kind of abscess not unfrequently forms in erysipelas; or after wounds, injuries, and punctures; and from the inoculation of an animal poison. The character of the succession of morbid actions it presents is want of vital power and resistance, and a speedy solution of the vital cohesion of the affected tissues. It would seem that the influence of the ganglionic nerves supplying the capillaries of the part is rapidly, or almost instantly, destroyed by the cause of the disease; and that the vessels, thus deprived of a great proportion or the whole of their vitality, allow the escape of the more fluid parts of the blood, and the infiltration of the tissues. The vessels pass rapidly, and without the previous grades of healthy inflammation, into that state which admits of the effusion of a watery or puriform sanies. The state of vital energy, and the deficient crisis, or unhealthy condition of the blood itself, probably contributes to this result; and, with the effect of this effusion on the diseased part, promotes the rapid exhaustion of the remaining action of the capillaries.

15. Diffusive abscesses generally commence in, and spread rapidly in the direction of, the cellular tissue. They affect also, in a very marked manner, the other structures placed in their way. They seldom commence in the internal viscera, as the liver, lungs, &c.; but when they do thus originate, as is occasionally observed in the latter stages of malignant or ataxic fevers, in exhausted states of the frame, &c., they nearly approach the characters they assume in the cellular structure. In almost every case of this disease, the constitutional disturbance is very remarkable; and the powers of the nervous system, particularly that presiding over the organic and assimilating functions, uncommonly depressed. Locally, the effusion of a watery, or sero-albuminous, or a sero-sanguineous fluid is nearly coeval with the affection of the cellular tissue and congestion of its capillaries. The vital cohesion of the inflamed texture is rapidly dissolved; and the fluid, abundantly poured out in its areolæ or cellules, distends the part, diminishes its vital functions to the lowest grade, and, at points, lacerates its tissue, thereby partially cutting off its connection with the adjoining structures. Thus the fluid is effused from the congested capillaries of the affected part in numerous places: in some, forming considerable collections; in others, mere infiltrations. Parts of the cellular tissue itself, and, in rare instances, as the mischief proceeds, portions of adjoining or intermediate textures, are deprived of all vitality, sphacelate, and mix with the fluid effused.

16. In many cases the integuments participate but imperfectly, and often not at all, in the morbid action; whilst the process, as now described, is going forward; and the great effusion into, and

partial destruction of, the cellular tissue, have enormously distended the limb or part in a diffused manner and to a great extent, and given it a boggy or imperfectly fluctuating character. At a later period, parts of the more attenuated or discoloured integuments vesicate, ultimately burst, and give issue at first to a discoloured puriform secretion, which afterwards becomes offensive and otherwise modified. When the skin is affected, it generally presents a dark or livid hue: its temperature is seldom above (excepting, sometimes, at the very commencement of the antecedent inflammation), and frequently sinks below, the natural standard.

17. With respect to the appearance of the secretion in this form of abscess, I may state, that it not only varies remarkably in different cases, but also at different stages of the same case. At first, the fluid effused and infiltrating the cellular structure consists chiefly of a limpid, reddened serum, which readily flows from the divided structures; in a more advanced stage, the effused matter is less fluid, often high-coloured, but without the whiteness and opacity of purulent matter. Afterwards, the cellular membrane is engorged with a white semi-fluid matter, which separates the particles of fat and cellular tissue at an unusual distance from each other. In subsequent stages it continues opaque; but often becomes reddish, greenish, and more fluid. At a still more advanced period, the infiltrated cellular and adipose tissue are entirely broken down, and the sphacelated portions hanging into, or mixed with, the puriform matter; which sometimes now presents the appearance of a brownish, purulent sanies, sometimes a greenish pus, and at other times a sero-purulent matter of various shades of colour and degrees of consistence. At no period of the disease is the matter contained in any circumscribed cavity, but is gradually and irregularly lost in the surrounding cellular tissue; without any demarcation, or appearance of coagulable lymph about the circumference of the diseased part. In general, the purulent secretion speedily assumes an offensive odour, and its sensible qualities are otherwise altered, and often variously, upon the admission of air to the diseased surface.

18. The muscular structure, and other parts in contact with the puriform matter, and in the way of the spreading disease, is generally much discoloured, softened, easily torn, and sometimes partially destroyed. In some cases the muscles are paler; in others, darker, and more livid than natural. In rarer instances, the adjoining bones and more resistant structures are also affected. (See INFLAMMATION, *Diffusive*.)

19. 3d. *Abscesses consequent upon inflammation of lower grades of intensity.* — The more slow and obscure the progress of inflammation, the less marked are the signs of irritation preceding and accompanying abscesses. It is not uncommon to observe, in lymphatic and phlegmatic temperaments, fluctuating tumours of various sizes, both superficial and deep-seated; without any considerable pain or increase of animal heat, either antecedent or subsequent to their formation. Purulent collections, of a chronic and indolent character, generally proceed from a low but continued state of irritation, or from reiterated excitation of so low a grade as scarcely to influence the sensibility of the part; and occur in constitutions of weak vital

resistance and defective restorative energy. On the other hand, the abscesses described in the preceding sections result from inflammation of a more or less acute character, occasioned by active stimulation or deleterious agents, and generally affect the system in a more or less active manner.

20. Owing to the low grade of irritation in the affected part, the vessels are but little, and often scarcely perceptibly, injected. The abscess, in place of commencing with a number of distinct centres or foci, appears at first as a single isolated collection in one or more of the cellular areolar, and presenting, from the commencement, a manifest fluctuation. In some cases, this appearance of the affected part is less than of true phlogosis than of a deviation from its nutritive actions. The tissues, instead of attracting, in virtue of their vital endowment, the nutritive particles; and the vessels, instead of imparting them in an appropriate condition, and exhaling a fluid suitable to the healthy state of parts, are so far changed as to fail in the performance of these actions; the vessels furnishing a fluid of a certain kind, apparently composed of the particles or globules which, under the influence of healthy vital endowment, would have been separated from the circulating fluid for the nourishment or growth of the tissues, and of the watery exhalation destined to lubricate them, and render them fitted for their functions.

21. In the chronic varieties of abscess, the *pus*, being secreted under the influence of a lower grade of excitation, differs from that previously described (§ 7, &c.). It is frequently yellowish, serous, transparent; containing flocculi of an albuminous or fibrinous nature, and whitish, opaque appearance: sometimes it is mixed with minute shreds of cellular-like substances. In other cases it is nearly analogous to mucus, from its thickness and viscosity. In some subjects, when very slow in its formation, it assumes a greater consistence and opacity, resembling half-congealed lard or liquid honey; and the tumours which it forms seem to constitute a connecting chain between pure abscesses and melicerous or steatomatous cysts. These latter differ in no respects from abscesses devoid of active inflammation, but in the greater consistence of the matter they contain: and in some cases, as M. DUPUYTREN remarks, it is difficult, if not impossible, to distinguish between them.

22. Owing to the extreme slowness of their formation, and the absence of acute inflammatory action, the *parietes* of the present kind of abscess have a more distinct organisation than those of the first species. Vascular injection and redness are here seldom observed exteriorly to the cyst enclosing the purulent collection. The skin covering the tumour, and through which the fluctuation is readily felt, is generally free, moveable, and unaltered. All the morbid action seems concentrated in the diseased membrane enclosing the matter. This membrane or cyst is, internally, of a reddish grey tint, and more or less intimately connected with the surrounding structure. It is in some cases soft, thin, and cellular; in others, thick, strong, and of a cellulo-fibrous, or even fibrous structure. The slower the tumour is in enlarging, the more liable is the cyst to undergo change, and to modify the state of the matter it contains: and, hence, abscesses of a very slow or chronic kind, often approach slowly the nature

to the characters of several other encysted tumours.

23. The purulent collections which form around foreign bodies, that occasion but little irritation, generally belong to the present kind of abscesses. They are always lined with a firm cellular cyst, analogous to that enclosing the foreign body itself. The abscesses which proceed from bodies occasioning great irritation are preceded by great pain and inflammation, and belong to the preceding kind of abscess.

24. 4th. *Of symptomatic abscesses, or collections of matter at a distance from the places where the pus is first formed.* In the foregoing sections I have considered the formation of abscesses in, and their limitation to, the primary seat of irritation: but if the parts affected are surrounded by a loose areolar cellular tissue, readily permeable by the matter as it is formed; and especially if the state of vascular action and vital energy of the frame are insufficient to the production of coagulable lymph around the inflamed centre; the matter gradually finds its way in the course of the cellular structure to adjoining parts, particularly to those which are more dependent, infiltrates them, and forms, more or less distinct and fluctuating, tumours at a distance from the primary seat of inflammation. Instances of this kind of abscess are furnished us in diseases of the hip-joint, and in cases of inflammation commencing in some or one of the vertebræ, or their fibro-cartilages. In this latter case, if the disease commences in one of the dorsal vertebræ, the purulent fluid may accumulate under the pleura, infiltrate the adjoining cellular tissue, and, following the direction of the ribs, appear at some part of the side or back, or even near the sternum, far from its origin. When the inflammation attacks one of the dorsal or lumbar vertebræ, or intervertebral structures, it may travel in a similar manner behind the pillars of the diaphragm, proceed in the course of the psoæ and iliac muscles, following the cellular tissue behind the peritoneum, and appear exteriorly, most frequently under the crural arch, but sometimes through the inguinal ring. In other cases it proceeds to a shorter distance, and points at the sacro-iliac symphysis, or in the angle between it and the spine: or it may extend down the pelvis in various directions, following the cellular substance surrounding the vessels and nerves. Thus it may pass through the ischiatic notch, forming an abscess at the internal part of the gluteal muscles; or along with the great sciatic nerve, and point on the superior and posterior part of the thigh; and, lastly, it may find an issue in the perineum, at the margin of the anus, or into the rectum, or even into the vagina. In some rare instances a double tumour and opening are formed. In the case of a female by whom I was consulted, the matter had found its way to the integuments of the sacro-spinal angle of the loins, where it was punctured by a surgeon, and yet had also burst its way into the vagina. In the case of a groom whom I attended, a tumour formed at the sacro-iliac symphysis, below the crural arch, producing the most violent and painful tumefaction of the limb, owing to the pressure of the matter on the nerves and veins; and the matter afterwards burst into the lower part of the sigmoid flexure of the colon.

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tomatic of inflammation and ulceration of bones or cartilages is generally greyish, thin, mixed with albuminous flocculi, minute clots of blood, and portions of phosphate of lime. It exhales a nauseous odour: but this characteristic is present only after the opening of the tumour, and when the air has access to the cavity.

26. If we examine the cavities of symptomatic abscesses, and trace them from their origin to their outlet, we shall find, in the former situation, the cartilages and bones profoundly changed: the bones are softened, friable, changed to a greyish black, partially absorbed and carious, and their periosteum destroyed. From this origin of the disease is formed a channel or sinus, traversing the cellular structure frequently in the course of the large vessels or muscles, and terminating with the external outlet of the tumour. The whole of this canal or sinus is usually surrounded by a softened, friable, or lardaceous state of the textures; and lined with a smooth, thick, firm, cellular, or fibro-cellular membrane, which in some cases is of a fibro-cartilaginous structure. At the lower part, the canal generally dilates into a considerable cavity, sometimes irregular or sinuous in its form, and lined with the membrane usually found in the more chronic kinds of abscesses.

27. 4th. *Of consecutive abscesses; or collections of matter found in situations consecutively to its formation in distant parts, between which there exists no communication.* It has been not infrequently remarked, that inflammation of a part has taken place, and has gone on to suppuration; that the matter thus formed has been absorbed; and that it has subsequently formed in some other viscus; generally in an internal organ. The nature and procession of the morbid phenomena now enounced have led to some enquiry, particularly in recent times. The circumstances in which consecutive abscesses occur in practice are the following:—

Inflammation of the internal surface of the uterus, or of its veins, or of both the substance of the uterus and veins, occasionally takes place after child-birth, and terminates the life of the patient. On dissection, purulent infiltrations or distinct collections of pus are found, in one case, in the lungs; in another, in the liver; in a third, in the substance of the brain; in a fourth, in the capsules of the joints; and, in a fifth, in both the lungs, liver, and perhaps, also, in the joints. A man, from injury of the head, has inflammation of the sinuses of the brain, followed by all the symptoms of a vitiated state of the circulating fluid, terminating in death: after which, abscesses, or purulent infiltrations, are found in the liver or lungs. A similar procession of phenomena occasionally results from phlebitis consequent on blood-letting, or other causes; also during the suppurations following amputations, particularly when the matter is confined on the face of the stump, by the adhesion of the integuments which had been drawn over it. A child seized with severe or confluent small-pox; and during, or subsequently to, the secondary fever, fluctuating tumours form in the joints from matter accumulated in their capsules. Upon dissection, the cartilages are found eroded; and, in other rare cases of this kind, purulent collections are found in the internal viscera. In other instances, abscess disappears from external parts; the patient

sinks with low fever; and, upon dissection, collections of pus are found in internal organs. In cases of this description, the following require notice:— 1st, The state of the vital energies preceding or during the occurrence; 2d, The symptoms characterising the progress of the phenomena; and, 3d, The nature of the results.

28. 1st, The energies and vital resistance of the system are generally greatly impaired, either from pre-existing or concurring causes, in cases where consecutive abscesses form. (See article on *Inflammation of Veins*.) 2d, The depression of the powers of life increases as the disease advances. The nervous system is seriously affected; the circulating fluid betrays change in its appearances after its emission, or after death; the soft solids lose their vital elasticity and cohesion; the surface of the body and countenance become dusky and livid; and low delirium, rapid and weak circulation, &c. take place. 3d, The purulent matter is generally either infiltrated into the parenchymatous structure of some organ, or collected into one or more distinct abscesses, or it is effused into the cavity of one or more joints. When the matter is infiltrated into the texture of an organ, the infiltrated structure is very frequently also softened. The purulent collections that are found in other cases generally have no distinct cyst, and the surrounding substance of the organ seldom presents any marked redness or injection of its vessels, or indeed any remarkable change, excepting in some instances a slight softening. The matter is usually found in several distinct abscesses or collections, varying from the size of a small seed to that of an egg, or even larger. Sometimes the immediately surrounding structure seems impacted around the abscess, but not otherwise changed. The purulent matter itself varies but little from that which is observed in the abscesses described in the first section. (§§ 6, 7, 8.) It is occasionally of a darker or greenish hue, particularly when found in the liver.

29. As to the *Origin* of these purulent collections, some doubts may be entertained. That they are very intimately connected with the primary inflammation and formation of matter in other parts of the system, cannot be doubted, but in what way cannot be so readily stated. It seems to me extremely probable, from the attentive observation of the progress of a number of such cases which have come before me in practice, that, owing to depressed vital energy, and deficient resistance of the frame, purulent matter passes into and vitiates the blood; that the morbid condition of the circulating fluid, thus induced, depresses still lower the already weakened nervous powers; and that the irritating matters carried into the circulating current change the state of the capillaries of parenchymatous and some other organs, so that they secrete purulent matter without any evident sign of previous or accompanying inflammation. Several French pathologists suppose that the purulent matter conveyed into the blood circulates without combining with it, and is merely deposited by the capillaries, or separated by them, from this fluid in parts; the vessels and texture of which are most disposed to permit its elimination, or the best constituted to admit of its deposition. It is difficult to determine in which of those ways the consecutive abscess is formed. Indeed, both may approximate

the truth, the consecutive formation of pus arising, in one case, from the irritation occasioned by the presence of morbid matters in the blood; and, in another, chiefly from the separation or secretion of it in the parenchyma of an organ, without any previous or attendant irritation.

30. II. OF THE PROGRESS AND TERMINATIONS OF ABSCESSES. — At any period of its existence, the inflammatory action in an abscess may cease, and the matter which has been formed be absorbed. In these cases the purulent matter is carried into the circulation; and, whether the inflammation is primarily and gradually extinguished in the abscess, or whether intense pain and inflammation, developed in some other organ, exercises on the first centre of mischief a true revulsion, the absorption of the pus is only consequent upon the subsidence of the local signs of inflammation and congestion. The part loses its turgescence, redness, increased heat, and tumefaction, and is restored to its healthy state without any deformity or cicatrix. In these cases the absorbed matter is eliminated from the circulating mass, without accumulating in it to a hurtful extent, by the active or unimpaired functions of the various eliminating organs, particularly by the kidneys, and mucous surface of the intestinal canal, — the matter, in some cases, being apparent in the urine, and in the others exciting a temporary diarrhoea.

31. In other instances, the inflammation productive of suppuration being but slight, or being less completely dissipated, and the solid tissues, and particularly the firm and thickened cyst, opposing the extension of the abscess, it occasionally rests long stationary. In this case the pus remains inactive and inoffensive in the part, like a smooth and inert body lodged in a cyst. Abscesses will sometimes continue for a very long time unchanged, and without occasioning much disturbance to the economy, particularly when deeply seated. In such cases the cyst becomes more and more firmly constituted, thickened, and changed from the state of the surrounding parts; so that the pus is in some measure isolated from the adjoining structures: in this state it may remain, as in the brain and liver, for a considerable time, without any very marked symptoms, until some accident or exciting cause occurs to affect it and the adjoining parts, when the usual course of the disease will be resumed.

32. The foregoing changes are comparatively rare. In the great majority of cases, pus distends, compresses, and obscurely excites, the parts in which it is lodged. Instead of being diminished, the abscess is increased in size, and tends to find an external outlet, uniformly in the direction of either the cutaneous or one of the mucous surfaces. Purulent matter is thus submitted to the general law of the economy; the vital resistance, opposed to all substances calculated to excite or otherwise injure the textures, detruing it by a regular process of phenomena, as long as the energies of the system are not entirely overwhelmed, to the nearest or most unresisting part of the surface, and at last expelling it altogether from the body.

33. The succession of morbid phenomena occasioning the deliverance of the system from collections of matter, is of great importance to the practitioner, particularly as respects deep-seated or internal abscesses. Generally the quantity of

matter is continually increasing, owing either to the extension of suppuration in the inflamed part, or to a continued secretion from the internal surface of the abscess, or to the concurrent operation of both causes. In consequence of this increase of quantity, the parietes of the abscess are distended and applied more closely to the surrounding parts, which are pressed outwards by the accumulated matter. This distending power is equally exercised from the centre to the circumference. But, as all the adjoining parts do not exercise the same degree of resistance, the abscess extends in the direction of the external or free surfaces; its more deeply seated parietes being sustained by all those parts which are placed beneath them; whilst the tissues which are exterior to it, being deprived of aid, are readily elevated and distended by the increased effusion.

34. As to the nature of this effusion, and the changes it undergoes, certain questions have been urged. It has been supposed that the matter found in abscesses is not secreted in the state in which it exists at the period of maturation: but that the fluid effused is in a state which may be called albuminous serum; which, owing to the continued exhalation and absorption taking place in the internal surface of the abscess, is changed into what is called well-digested pus. Others suppose that the purulent fluid is secreted in the state of pus, or nearly approaching to it, by the membrane forming the cyst, and which, as it presents many of the characters of mucous membrane, may, like this membrane, when highly inflamed, secrete a purulent fluid. It is extremely probable that both views may be in a great measure correct: for attention to the maturative process in recent abscesses shows that the fluid first effused is not pure pus; and it is undeniably proved that the matter contained in the different kinds of abscesses is variously modified according to their duration, their situation, and the circumstances attendant on their progress. Whilst, on the other hand, it must be conceded that the internal surface of an abscess, particularly in a high state of inflammation, or when irritated by the contact of the air, will secrete a purulent fluid, or a matter which very rapidly assumes the puriform character; the vessels terminating in it giving issue not only to the watery part of the blood, but also to many of its smaller globules, so as readily to form a pure pus, which quickly becomes thick, upon the evaporation or absorption of a portion of its more fluid constituents.

35. Another important matter, relative to the progress and external pointing of abscesses, is the fact, that inflammation generally centres upon the adjoining structures, as the internal membrane is more closely applied to them. The parts most distended, and stretched by the contained fluid have the inflammatory action extended to them from the parietes or membrane of the abscess. To the inflammatory irritation thus induced in the surrounding textures succeed their adhesion to the parietes of the abscess; absorption of their solid elements, with attenuation; and, lastly, ulceration. — the integuments merely often resisting for a considerable period the discharge of the fluid.

36. If we take as an example the not unfrequent occurrence of abscess in the substance of the liver, and trace its progress in one of those

directions which it sometimes follows, namely, through the diaphragm and lungs, until it empties itself into the bronchi, we shall find the following to be the course of the morbid phenomena:—As the inflammatory action and the secretion of purulent matter proceed, the abscess which has been formed, generally in cases of this kind in the convex part of the organ, advances towards the surface; the inflammatory action extends to this part; and lymph is thrown out, which, with the pressure of the swelling and pointing of the abscess, irritates the peritoneal surface of the diaphragm, inflames it at the part opposite, and occasions its agglutination at this situation to the parietes of the hepatic abscess. As the tumour points upwards, the inflammatory action advances in the same direction; extends to the muscular structure of the diaphragm, which is softened and attenuated, assuming at the same time a dark or bluish tint; and invades the diaphragmatic pleura, where it throws out coagulable lymph. This secretion occasions irritation and inflammation in the opposite part of the pulmonary pleura, and the cohesion of the lung to the diaphragm at the part where the collected matter is advancing prominently upwards. As the parts thus successively involved undergo the softening process consequent on inflammation, and yield before the pressure of the accumulated fluid, owing to their diminished vital cohesion, absorption commences and proceeds in the central or prominent part of the tumour; and the matter thus finds its way in the direction which is most yielding, where the inflammatory action most readily advances, and where the resistance to it is thereby still further diminished. I have had frequent occasion to trace the above phases of the progress of large and deep-seated abscesses; and to satisfy myself that they proceed in a similar manner, whether they advance to the external surface of the body, or open upon a mucous surface, or into a shut cavity; which last is a rare occurrence.

37. It is of importance to observe the procession of phenomena now stated; inasmuch as the successive reddening, inflammation, adhesion, softening, and absorption of the various structures, as the tumour advances exteriorly, are the guides to a very important part of the treatment of these formations. Thus, when we observe marks of inflammatory irritation of the skin take place in the situation of an internal abscess, we may infer that the ulterior phenomena now enumerated, particularly adhesion, have taken place in the parts beneath, and we may safely decide upon carrying an incision from the centre of the inflamed integuments to the seat of abscess.

38. It must not be overlooked, that various aberrations of purulent collections take place, in their progress to the surface, and that they often proceed in a direction opposite to that of gravitation, owing to the resistance of bones, fasciæ, and aponeuroses; which last oppose them in a most remarkable manner, and cause their extension in various directions, giving rise to the most severe local and constitutional sufferings.

39. Abscesses, besides, cause the inflammation of parts placed between them and the centre of the system, as respects the direction of the circulating vessels, as well as of those parts situated exteriorly to them, although in a much less degree, and followed by very different results; for, in-

stead of the thinning, erosion, and ulceration of the exterior parts, tending to advance them to the surface, the inflammation of the parts behind, or more deeply seated than they, is frequently accompanied with thickening, and increased density of structure; whereby the system is, in a great measure, protected from their extension to more internal and vital parts. Numerous instances occur, where the periosteum or the peritoneum, the pleura, the fibrous and synovial capsules, undergo a marked thickening, opposing thereby an increased obstacle to their extension in that direction, when abscesses form in the vicinity of those membranes. When, however, the energy of the system and its vital resistance are deficient, exceptions sometimes occur to this rule, and abscesses find their way, when situated favourably to this mode of termination, into important cavities and organs. Thus, an abscess seated deep in the parietes of the chest or abdomen, may open into these cavities, as in the case of the son of the eminent M. PERIT; or an abscess in the liver may find its way into the pericardium. But any disposition to its opening internally, is opposed not only by the thickening of the serous and other membranes, &c., as here instanced, but also by the support of the viscera underneath, which resist the pressure and extension of the tumour in this direction.

40. The progress and spontaneous opening of abscesses, advancing in the manner now explained, terminate with the erosion of the integuments, which, having been reduced to a pimple, have their epidermis elevated in the form of a phlyctena, which soon breaks, and gives issue to a portion of the contents of the abscess; and the discharge is renewed at intervals, by the gradual retraction of the parietes of the cavity upon the re-accumulated secretion. The successive evacuations occasioned by the reaction of the parietes of the abscess, are particularly favourable in cases of large abscess, by preventing any vacuity. In cases of empyema, for instance, where the artificial opening is often fatal, a favourable result not unfrequently follows a spontaneous and successive evacuation of the purulous collection: for it is chiefly by imitating the natural process in those cases, that we secure the greatest advantages to the patient, where we find it requisite to open symptomatic abscesses, as those usually called lumbar; and not by making large incisions, and producing a large evacuation, whereby the air has access to their cavities, but by successive punctures, the margins of which are immediately closed, upon the evacuation of that part of the contents which are first expelled by the reaction of their parietes.

41. The passage of air into the cavities of abscesses is always followed by an increased state of irritation of their lining membrane. The hurtful effects of this communication have been demonstrated by M. DUPUYTREN, and other eminent men, although denied by others, but without either the satisfactory proofs of experience or of reasoning. In some cases the accession of inflammatory action in the part, upon the access of air, is very remarkable. In cases of small chronic abscesses this effect is often beneficial; but in large and acute abscesses the irritation thus induced may be too great for the powers of the system to withstand.

42. Under the most favourable circumstances, the effects of the admission of air into the cavity of an abscess are counteracted by the accompanying treatment; and the discharge soon assumes a different appearance from that of the matter first evacuated: it becomes less white and consistent; and, subsequently, when the parietes commence forming the adhesions which precede cicatrisation, it is merely a more or less copious citron-coloured serosity.

• After the opening of slow and indolent abscesses, the serous, thin, and flocculent pus with which they are filled, is replaced by the discharge of a more digested, homogeneous, and cream-like fluid, indicating a more intense state of action in their parietes.

43. Upon examining the interior of abscesses which have been opened, it will be seen that their parietes gradually discharge themselves; that they cast off the grayish and flocculent pellicle which covers them; and that they become covered with cellular and vascular granulations, of a lively red and solid appearance, formed from coagulable lymph thrown on the inflamed surface, into which new capillary vessels shoot, and resembling the granulations on the surface of wounds, from which is exhaled the matter which succeeds to that first discharged from them. The parietes thus cleansed contract towards their centres, and in the direction of their most deeply seated parts. They afterwards unite; so that the cavity which has been thus circumscribed, at last disappears. In the situation of the abscess nothing is found but its cicatrix; at first consisting of a cellular lamina, or plate, of various thickness and density, penetrated by coagulable lymph, and subsequently converted into a scarcely apparent cellular line, which sometimes, at last, entirely disappears.

44. But the progress of abscesses after they have been opened, is not always so favourable. It may be premised, that the irritation proceeding from the contact of air with the internal surface of an abscess is, in general, in proportion to its volume, and the unyielding state of its parietes. When the abscess is small, the resulting irritation is but faintly marked: but if the parietes be of a large extent, and if the abscess is deeply seated, particularly if it be in any of the viscera, the inflammatory excitement occasioned by the air not only increases all the local phenomena, but also gives rise to serious constitutional disturbance, often terminating the life of the patient. The yielding state of the parietes, and their apposition, are sometimes calculated to counterbalance the bad effects occasioned by their extent. When the diseased surfaces have been freed by the complete discharge of matter, and admit of being closely applied to each other, the admission of air is in a great measure prevented, and adhesions frequently proceed rapidly. Where, however, the parietes cannot be brought closely together, and the cavity can be obliterated only by means of granulations formed to an extent that may fill it, the duration of the suppuration is prolonged, and the effects produced on the constitution by the extent of the discharge are often serious.

45. But this is not all the mischief resulting from the access of air to the cavity of an abscess: the pus which still remains, particularly in deep-seated abscesses, is more or less changed by it,

and exhales an infected or putrid odour, proceeding from decomposition occasioned by the temperature to which it is subjected, and its contact with atmospheric air. It is also often observed, that when large abscesses are opened, and air gains access to them, the morbid excitement thereby occasioned in their parietes, re-acts upon the principal vital centres; the nervous systems, the digestive organs, and the circulation suffering from and participating in it, and the suppurative process is thereby greatly increased; at the same time the constitutional powers are much depressed, the matter is rendered much more offensive, and otherwise changed, according to the seat of the abscess. As the powers of life sink under the disease, the fluid secreted is more offensive and disposed to decomposition, until it is often doubtful whether the change proceeds more from the access of air than from the low state of vital energy. Indeed, in many cases, the latter cause seems much more influential towards producing this state of the discharge than the presence of air; for we not infrequently observe, that as long as the constitutional powers remain but little depressed, the access of air has but little effect, the discharge exhaling no offensive odour; but as soon as, owing either to the increase of inflammation in the cyst, or to other concurrent causes, the febrile commotion is increased, and the nervous system and digestive organs evince serious disturbance and loss of energy, the discharge becomes rapidly offensive and increased in quantity; the matter often changing from a more or less pure pus to a state approaching to putrid sanies.

46. III. OF THE DIAGNOSTIC SIGNS OF ABSCESS.

When inflammation has attacked a cellular structure, or viscus, in which this tissue is a prominent constituent part, and particularly if it be intense in degree, rapid in its progress, and accompanied with a pulsative pain, we may with confidence decide upon suppuration being about to take place. This result is announced by a diminution of the pain, which changes to a pulsatory sensation isochronous with the pulse; by a feeling of weight and tension in the part; by a diminution of the febrile action, succeeded by a large, broad, open, soft, or undulating pulse; and by irregular chills or rigors, which extend, after various intervals, along the back, loins, and sometimes the lower extremities. If the matter is not soon afterwards evacuated, the symptoms of chronic irritation succeed; especially small and frequent pulse, heat or burning of the palms of the hands and soles of the feet; irregular and profuse perspiration, and night sweats; loss of strength; and all the characteristics of hectic fever, which makes more or less rapid progress, and is sooner or later followed by colliquative diarrhoea, according to the seat and extent of the abscess, the constitutional powers of the patient, and the treatment employed. The above symptoms indicate that a permanent cause of irritation, and of constitutional contamination, has succeeded to the state of active inflammation.

47. The tumefied state which characterises sthenic or phlegmonous inflammation, is greatly modified after suppuration has advanced. It becomes less diffused, is much lessened in the circumference of the periphery of the tumour, and seems more and more concentrated. Hence it

becomes more elevated, prominent, and softened at the centre of the surface. The redness and tension undergo a similar change. The circumference of the inflamed surface is restored in some degree to the natural state; but the more prominent part acquires a dark red tint, afterwards a bluish hue, and yields more and more to the pressure of the subjacent pus. For some time previous to this stage the tumour evinces a more or less distinct fluctuation when suitably examined, and this sign becomes more manifest as the abscess advances to the surface.

48. When an abscess forms in deep-seated parts or viscera, particularly those protected by solid envelopes, or by thick and unyielding structures, the diagnosis rests entirely upon the nature of the constitutional disturbance, and the disorder in the functions of the affected organ or part, and here the physician should see and appreciate the slightest difference taking place in the pulse, the animal heat, and the state of all the natural and organic functions. In these cases he requires the most exquisite tact for examination, in order to arrive at an accurate opinion. The symptoms which should guide him in cases of this description will be stated when I treat of the diagnosis of the different kinds of visceral abscess. I may, however, remark at this place, that, even in parts much less deeply seated, when the cyst of an abscess is greatly distended and very tense, fluctuation of its contents are generally extremely obscure, or even not to be felt, although its contents may be very fluid. Also, when the purulent matter is contained in no distinct cyst, but is disseminated through the textures, or infiltrated between fasciæ or muscles, or is confined beneath aponeuroses, great incertitude may exist as to its formation. The parts in such cases present more of a diffused oedema than of a fluctuating tumour; and if fluctuation can be at all felt, it is only obscurely.

49. It must be evident that the more feeble and latent the phenomena of the precursory inflammatory irritation, the more difficult is it to determine the period at which the elaboration of pus commences. We frequently observe in practice, particularly after phlebitis, injuries of the head, fractures, and capital surgical operations, abscesses form in the liver, mediastinum, lungs, kidneys, or ovaries, preceded merely by obscure and occasional pain, and furnishing no certain symptoms of a local kind, by which we can decide as to their formation, until the time that they appear externally, or are detected upon *post mortem* examination. Features of this description, the constitutional symptoms are our chief guides; but even these are often so uncertain and so imperfectly developed as to leave us in doubt. The accession in this obscure manner of internal abscess is particularly remarkable as respects those which supervene to inflammatory disease existing in other parts, particularly to phlebitis, and which I have denominated *consecutive abscesses*. (See *Veins — inflammation of*.)

50. Symptomatic abscesses generally escape detection until they advance externally. Previous to this, pain, uneasiness, tumefaction, &c. are only felt chiefly in the part originally affected. But the symptoms already noticed (§ 46—48.), especially the unhealthy aspect of the surface, the state of the febrile action and of the pulse, the

inspirations, the disorder of the respiratory function will generally serve, in conjunction with the changes in the part to which symptomatic abscesses extend, to indicate the nature of the mischief.

51. It is important, as M. DUPUYTREN has very justly remarked, to take into account, when determining the existence of abscess, the greater disposition inherent in some constitutions to form purulent matter. In some persons, the least irritation is followed by the suppurative process. This is particularly the case in persons of a pale visage, of a soft flaccid state of the different structures, and of the lymphatic temperament. It is also remarkable in those whose vital energies have been lowered by previous disease; by chronic affections of the digestive mucous surfaces; and by those diseases which require the performance of amputation, or other important surgical operations. When the suppurative process has continued for some time, and has afterwards been suddenly stopped by an operation, or any other active treatment, the disposition to form abscesses is generally remarkable. A similar remark may be extended to the sudden suppression of any accustomed secretion or discharge. The most familiar instance of this kind is noticed in the breasts of nurses, which are extremely liable to supuration upon interruption to the secretion of milk. These considerations should have their due weight with us when estimating the signs of the existence of internal abscess. These symptoms which are peculiar to collection of matter formed in each of the internal viscera are pointed out in their respective articles.

52. IV. OF THE PROGNOSIS OF ABSCESS. The danger from abscess is in proportion, 1st, to the extent of their internal surface; 2d, to the depth at which they are seated; 3d, to the indolence of their action, or the deficiency of vital action accompanying them; 4th, to the severity and danger of the disease by which they have been occasioned; 5th, to the sinking or deficiency of the constitutional powers under them; and, 6th, to the severity of the symptoms accompanying them, or produced by them. These positions are so obvious, that no remarks need be offered in support of them. I may, however, observe, that abscesses seated in internal viscera are always attended with danger; but the degree of danger will depend upon numerous circumstances connected with their seat, the direction which they take, the state of the vital energies of the frame during their progress, the chances of their evacuation, and the means of reparation and renovation the constitution may still possess.

53. The prognosis of chronic, symptomatic, and consecutive abscesses depends as much upon the nature of the preceding disease, as upon the state of the abscess itself. In chronic abscess, the danger is in proportion to the extent of the surface of its parietes, and to the grade of constitutional vice. In symptomatic abscess, the danger depends almost wholly upon the nature and extent of the original disease, of which it is the consequence, and upon the largeness of surface extending thence to the ultimate limits of supuration. In consecutive abscess, the danger is extreme; owing, in many cases, to the nature of the primary disease, the depressed state of the constitutional powers, and to the vitiation of the circulating

fluid and soft solids of the body, with which it is connected.

54. V. OF THE MEDICAL TREATMENT OF ABSCESS.—The indications of cure which we propose in abscess is, 1st, to remove the purulent collection from the part containing it; and, 2d, to procure the obliteration of the cavity in which it was lodged. The first intention is accomplished either by procuring the absorption of the purulent matter, and its elimination from the body; or by opening the parietes of the abscess, and thus giving a direct outlet to the contained matter. When the means used to accomplish the absorption of the purulent matter fail, or when the character of the abscess and state of the frame forbid the employment of these means, opening the abscess must be resorted to when the proper period for having recourse to the measure arrives.

55. 1st, *Means which may be resorted to, in order to procure the absorption of the purulent matter, and its elimination from the frame.*—Numerous instances have occurred of the rapid absorption of the matter contained in an abscess, and of its discharge from the circulation, 1st, by the urinary organs, the urine becoming abundant, and containing either a puriform secretion, or being otherwise altered; 2d, by the mucous surface of the bowels, attended with diarrhoea; and, 3d, by the cutaneous surface, in the form of a copious, thick, or viscid, and offensive perspiration. These are the most common channels of elimination of the purulent secretion, when absorbed into the circulation from the cavity of an abscess. The purulent collection may, also, disappear in consequence of other critical or accidental evacuations; but this result is of rare occurrence, and is a much more remote contingency than those enumerated. Experience having shown the possibility, and the great advantages, of removing the matter contained in an abscess by exciting absorption, the means most effectual in attaining this end should be first put in practice.

56. With this view drastic purgatives may be prescribed, when the state of the patient admits of them; and next to them, such diuretics and diaphoretics, as may be appropriate to the circumstances of the case. Contemporaneously with the use of those internal derivatives, external applications should be employed, particularly those which possess discutient, resolvent, and styptic properties. Frictions with stimulating substances, as ammoniacum, iodine, hydriodate of potash, &c.; cold, warm, or tepid affusions on the part; either of simple or mineral waters, of sulphureous or saline, natural or artificial, may likewise be tried conjointly with the internal means. But this energetic plan of treatment,—this combination of the revulsive and discutient practice,—this *methodus perturbatrix*, is not applicable to all cases. There are many circumstances connected with the seat and condition of an abscess, and with the state of the different functions, that either altogether forbid its employment, or require important modifications and adaptations of it.

57. Thus, abscesses preceded by acute or active inflammation, are rarely susceptible of being absorbed; the opening of them, therefore, is almost inevitable. Chronic abscesses, which are generally provided with thick cysts, also admit not of removal by this practice; it being generally requisite to excite a new action in their parietes,

which may modify their texture, and render them susceptible of contracting the adhesions requisite to their obliteration. The majority of purulent collections which are removed by absorption, is such as form rapidly, without much previous inflammation, and in debilitated habits, or in those weakened by pre-existing disease. In persons of this description, the excitement or irritation of the kidneys, or of the mucous surfaces, will often overcome the irritation existing in the seat of abscess, and consequently promote the absorption of the pus it contains; at the same time that the fluid abundantly secreted by the parts artificially excited will assume, in consequence of the state of the patient, a puriform character. (DUPUYTREN.) But, in the majority of instances of this kind, it is necessary that the artificial irritation or excitement shall be greater than that previously existing in the seat of abscess, and that the organs or parts in which it is induced be in a sound state; otherwise the revulsion cannot be either successfully or safely practised. However we may explain the mode of action of revulsants on abscesses of this kind, there can be no doubt that it is almost entirely in them, and particularly when they are seated in lymphatic glands, that we can hope successfully to employ this plan of cure.

58. When the evacuations procured from the first passages, and from the kidneys and skin, have no effect upon the tumours, and particularly if the stomach and bowels seemed to support their action with difficulty, they must be abandoned, and recourse be had chiefly to the more direct means of cure. The local excitants, as iodine, the sulphureous douches, frictions with mercurial, camphorated, and terebinthinated liniments, and the repeated application of blisters for a short time, are only suited to the chronic kinds of abscess, where little or no inflammatory action exists. But these remedies should be watched, lest they increase the heat and inflammatory action of the external or superficial part of the tumour, and thus occasion their external opening.

59. In the majority of abscesses, it is requisite to keep three facts in recollection: 1st, that the inflammatory action in their parietes does not cease on the formation of the purulent collection; 2d, that an abscess is generally a complication of this inflammation, and of the retention of purulent matter in the inflamed parts which formed it, the inflammatory action being still present, although in a somewhat modified state and grade, and still continuing to form this matter; and, 3d, that the existence of pus does not necessarily or materially change the nature of the action which produced it. The therapeutical indications to which these facts necessarily lead are important, particularly as they show, what, indeed, has been proved by experience, that antiphlogistic remedies, especially those of local application, should not be laid aside with the supervention of suppuration. In the majority of cases, and particularly when increased heat of the part still continues, this class of local remedies should be employed with an energy in proportion to the activity of the local symptoms. As long as pain, redness, heat, and tension remain around the abscess, so long should leeches, or other modes of capillary depletion, directed to its vicinity, be had recourse to, particularly if the state of the patient offers no urgent indications against the practice.

Emollient and astringent applications should also be constantly employed. These will generally reduce the inflammation of the surrounding tissue, favour the resolution of the parts not yet suppurated, limit the quantity of the morbid secretion, and favour the maturation of the abscess, so that it may be opened with the best hopes of success. In some cases, the use of these antiphlogistic measures will give rise to the absorption of the purulent matter, even after this had been attempted to no purpose by means of revulsants.

60. It should be recollected that the surfaces of abscesses are the constant seat of two kinds of action; one of exhalation or secretion, the other of absorption; and that whatever excites or irritates them increases the former, and whatever soothes or diminishes this irritation lessens it, and favours the latter action. This consideration should lead us strenuously to adopt a continued antiphlogistic and soothing treatment of the affected part, until the thinning of the skin at the most prominent part of the tumour indicates the necessity of opening it.

61. In symptomatic abscesses, the treatment should chiefly be directed to the primary seat of disease; for as long as the mischief continues or advances there, the purulent collection increases, and diminishes as it subsides. Thus, the abscesses that point near the anus or crural arch, in consequence of disease of the vertebrae, will sometimes disappear after the use of active means directed to the original malady, and judiciously adapted to the state of the patient.

62. Consecutive and spreading abscesses require a very different management from that now pointed out. These generally occur in persons of an unhealthy habit of body, or who have been weakened by acute disease; or they are the result of an adynamic or ataxic and spreading inflammation occasioned by a specific or poisonous agent; and they are not infrequently the consequence of the inflammation of veins, or of the presence of morbid secretion or purulent matter absorbed into the circulation, (§§25—28.), or of the transfer of irritation from a distant part. But from whatever cause they may proceed,—and they may, and occasionally do, proceed from either of those sources,—deficient constitutional energy, and vital resistance to the influence of the exciting cause, with a marked disposition of the structures to be invaded by it, and to participate in the morbid action it excites, are their constant concomitants; requiring the energetic use of those means which are the best calculated to rouse the powers of the frame, to restore the deficient tone of the capillary vessels, and to thus enable them to form coagulable lymph, by which the spread of the local mischief may be limited. Instead, therefore, of having recourse to antiphlogistic remedies, the state of local action, and of constitutional power, requires a tonic, stimulating, and restorative treatment; conjoined with the means best calculated to promote the functions of all the abdominal viscera, so that morbid matters may be eliminated from the circulating current, and healthy nutritious elements conveyed into it; and with a pure air to perfect the changes which it undergoes during respiration, and which are requisite to the continuance of the functions of life. The treatment necessary in such cases is fully detailed in the articles on INFLAMMATION OF

VEINS, on SPREADING INFLAMMATION of the CELLULAR TISSUE, and on the treatment of ANIMAL POISONS.

63. 2d. *Of opening abscesses.*—When we fail in procuring the absorption of the puriform matter, its artificial discharge will, sooner or later, be required, when this can be accomplished. Certain abscesses require a more immediate performance of this operation than others, and more particularly the following:—1st, Abscesses proceeding from the escape, into the substance of any organ or part, of irritating secretions or excrementitious matters, as the urine, or faecal substances. 2d, Abscesses preceded by very acute inflammatory action, and occurring in cellular or adipose structures, as the margin of the anus, the sides of the neck, or the groins. 3d, Purulent collections deeply seated, or confined under fasciæ or aponeuroses. 4th, Abscesses formed in the parietes of the aplanchnic cavities, in order to prevent the chance of their breaking internally. 5th, Abscesses formed in parts through which large nerves and blood vessels pass, and on which the purulent matter occasions a painful and injurious pressure; as abscesses in the neck, and underneath the sterno-mastoid muscle, at the top and inside of the thighs and arms, &c. 6th, Abscesses which embarrass the respiratory organs, and which press upon the larynx, pharynx, or trachea, or which endanger the integrity of the parts.

64. In all these the strict antiphlogistic treatment will be requisite, unless they are of the diffusive or consecutive kinds, with emollient applications, in order to limit the extent of the inflamed parts, to diminish their size, and to hasten their maturation; and in many cases this mode of treatment must be continued for a considerable time after the discharge of the matter, in order to limit or prevent its re-accumulation, and to promote the collapse and diminution of the parietes of the abscess. The cases where it will be frequently necessary to retard the period of discharging the purulent collection, are chiefly those in which it is formed in the internal viscera, as the liver, spleen, kidneys, lungs, &c.; respecting which I have treated fully under their appropriate heads.

65. Chronic abscesses should be opened as soon as it is shown that their absorption cannot be accomplished; or when they augment in bulk under the discutient and derivative treatment. Symptomatic abscesses also require to be opened, when we find that the means which we have directed to the original seat of disease fail of limiting their extension, or lessening their bulk. Consecutive abscesses require to have their contents immediately discharged, when their situation admits of this being done; for the morbid state of the matter they sometimes contain, and the weak vital resistance opposed by the surrounding parts, and by the constitution, favours the contamination of the adjoining structures, and, indeed, of the whole frame. But this intention can seldom be fulfilled, owing to the seat of the purulent collection; and, when it is put in practice, it should be followed by as complete an exclusion of the atmospheric air as possible.

66. It does not come within the scope of this work to notice, at this place, the different modes of opening abscesses, and the treatment with which the operation should be accompanied and

followed. This necessarily differs in every case; but that part of it which belongs to my province is stated at the place where abscesses in the different viscera are discussed, and the means which may be employed, to procure the obliteration of their cavities, the second intention of cure, are noticed, with reference to abscess of each of the important viscera and structures in which it is liable to form.

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ABSORPTION. SYN. *Absorptio*, Lat. *Absorption*, Fr. *Die Einsaugung*, Ger. *Assorbimento*, Ital.

CL. OF. GENERAL PATHOLOGY AND THERAPEUTICS.

This is one of the most important functions in the system, and one of the most frequent channels through which disease is caused, perpetuated, or removed. As to each of these relations it requires a brief notice.

1. OF ABSORPTION IN RELATION TO THE CAUSATION, PERPETUATION, AND THE REMOVAL OF DISEASE. — The importance of entertaining accurate ideas as to the channels through which noxious agents affect the system, must be manifest. Without them, many of our pathological doctrines must be erroneous, and the therapeutic indications founded on them worse than useless: on the other hand, just views as to the nature and extent of the causes which operate through this medium, give rise to the most important inductions, — the chain of morbid causation is traced without interruption, the nature of pathological conditions is more accurately observed, and ultimate effects are recognised in due connection with remote causes. The practical advantages which accrue are great: prophylactic measures are based on sound principles; remedial agents are directed with precision; and the physician prescribes in a spirit of rational induction, instead of blind empiricism.

2. The agents which affect the system injuriously through the medium of absorption consist, first, of those which are external and foreign to the body, and act upon it only occasionally, or under certain circumstances; and, secondly, of those which are generated in the body itself, and, when carried by means of absorption into the current of circulation, produce very important effects. The former rank among the primary causes of disease; the latter are themselves the result of disease, but become important secondary causes, perpetuating and generally increasing its severity. The first class invade the system on the

mucous and cutaneous surfaces, — the skin, the lungs, the alimentary canal, &c.: the second class form in the parenchyma or texture of organs and parts, or are generated on secreting surfaces, whence they are absorbed into the circulation. On each of these I shall offer a few remarks.

3. 1st. *Of absorption on the skin in relation to the production and removal of disease.* — a. That disease frequently proceeds in this way is evinced by certain contagious and chronic affections of the skin itself: that it is possible to produce various derangements, by applying to it several active agents, which affect this surface no further than in being absorbed from it, may be proved, by direct experiment. But it is chiefly when the skin is deprived of a portion of its cuticle, however minute, that we perceive affections produced through the medium of cutaneous absorption. Several eruptive and contagious diseases are familiar examples of this; and the majority of deleterious agents produce a most decided effect when applied to the skin thus exposed.

4. b. The same channels through which disease invades the system, are often the most suitable through which to counteract or remove it. This is shown by the treatment of syphilis; by the use of baths, lotions, fumigations, and inunctions in cutaneous and visceral affections; and by the employment of various remedies to the skin, which are partially absorbed from it into the system. When the skin is deprived of a portion of its cuticle, it absorbs rapidly many of the most active agents employed in medicine; and it is thus rendered one of the most eligible situations to which we can direct our plan of cure. Thus, when the stomach will not retain the sulphate of quinine, it may be efficaciously administered to the denuded cuticle; or when we wish to produce an anodyne effect upon the system, or to assuage violent pain, the preparations of morphia, as the acetate, may be applied in this way. And in various diseases, when the function of deglutition is lost, or the mouth cannot be opened, certain active remedies may be thus administered; more especially those which operate their effects after having been absorbed into the circulation. Even purgatives, as the croton oil, and elaterium, some preparations of iodine, strichnine, prussic acid, tartar emetic, &c., if judiciously employed in this way, will be often productive of advantage, and are not infrequently required to be thus prescribed.

5. 2d. *Of absorption from the lungs in relation to the causation and removal of disease.* — a. There are very few, if indeed any, of the numerous maladies which are usually denominated infectious, that are not caused through the medium of the lungs. And, though the greater proportion of them are most probably induced from the morbid impression which their exciting causes make upon the nerves supplying this organ, yet several of them are also, more or less, occasioned by the absorption of the cause itself into the circulation, and by its influence upon the blood, and the pervious and vascular systems. Probably, also, certain other causes of disease, of no mean importance, particularly marsh miasmata, and noxious animal exhalations, act directly upon the organic perves of the lungs, and on the blood itself, through the medium of absorption. We

have reason, moreover, not only to infer that the more material causes of disease are absorbed from the surface of the lungs, when inhaled into them with the atmosphere, in the moisture of which they are dissolved, or otherwise combined; but also that the foreign gases, which sometimes mix with the air, act in some measure through the same channel.

6. The organisation of the respiratory surfaces, the nature of the circulating functions on these surfaces, and the more immediate relation subsisting between the air in contact with, and the blood circulating in, them, will readily explain the rapidity with which foreign matters floating in the atmosphere are frequently conveyed into the circulation. Besides, we have strong reasons to infer that several of the gases, and of the soluble substances which float in the air, are carried directly into the blood from the surface of the lungs, without passing along absorbent vessels. The experiments of Professor MAYER, and of Drs. LAWRENCE and COATES, as well as those of MM. SEGALAS, FODERA, &c., fully confirm this inference; whilst those performed by MM. MAGENDIE, SEILER, FICINUS, TIEDEMANN, GMELIN, and several others, show, that even in the alimentary canal, and especially when capillary vessels are divided in any of our tissues, the function of absorption is not confined to lacteal or lymphatic vessels, but is frequently extended to the venous capillaries, which, in respect of certain substances particularly, chiefly perform this function. Hence I may conclude that foreign substances dissolved in, or combined with, the moisture of the air, or mixed with this fluid, may, when inspired, be carried from the surface of the lungs into the blood, independently of the absorbent vessels; although, doubtless, these vessels perform their appropriate functions in this as in other parts of the body.

7. b. The rapidity of absorption in the lungs, and the ready access to the blood which foreign matters find through them, are sufficient to vindicate their importance as channels through which to convey our means of cure, not only in those maladies to which they are liable, but also in a number of diseases affecting the whole frame, or particular parts of it. General suggestions on this subject are all that can be advanced in this place: the particular recommendations for its use are given in their appropriate places. Those gaseous bodies which possess active medicinal powers; all those remedies which are more or less volatile, or are soluble in aqueous vapour; and many medical substances which may be rendered volatile or soluble in water, when combined with other bodies that do not destroy altogether their remedial powers, may be prescribed advantageously through the medium of the lungs. Chlorine, the nitrous oxide, dilute oxygen gas; the vapour of iodine, or the sulphuret of iodine; the vapour of turpentine, camphor, of the common, the aromatic, or the pyroligneous vinegars; tar vapour; the chlorides of chlorurets of lime or of soda; aqueous vapour holding the active principles of opium, hellebore, hemlock, belladonna, digitalis, colchicum, &c. in solution; the volatile principles of various salts, the aroma of a number of vegetable bodies,—all exert powerful effects upon the system when administered in this way.

8. c. Through this channel a number of fevers, especially those which are characterised by great

depression of the powers of life, or which rapidly pass into this state; various chronic affections of the lungs themselves, which are unattended by acute inflammation, but consist chiefly of a morbid state of the respiratory nerves, and are accompanied with spasm, and a morbidly increased secretion; the different kinds and forms of asphyxy; the diseases which threaten life by interrupting the respiratory functions; and various maladies in which the blood is vitiated, and where it becomes important to act in a direct and decided manner on this fluid, and on the circulating organs generally, may be successfully combated.

9. d. The knowledge that we thus acquire respecting the channels, through which the causes of many diseases invade the system, and the remedies for removing them may be efficaciously administered, furnishes us with important indications as to the employment of prophylactic measures, and rational plans of regimen and hygiene. Miasmal or contagious fevers furnish us with numerous opportunities of proving the justness of these views. Observation shows us that the causes of this class of disease act upon the system chiefly from their presence in the air we breathe: it further enables us to decide that these causes invade the system chiefly through one of two, or perhaps by both, routes; viz. by the nerves supplying the respiratory organs, or by the partial absorption of the causes themselves from the pulmonary mucous surface, into the circulation. From the same source, or from the collateral evidence of experiment, we know that foreign substances do not so readily enter the circulation, when its functions proceed with energy, and the vital resistance is perfect, as when they act feebly and imperfectly; and that the depressing causes of disease have less power over the nervous influence of the respiratory organs, and of the system in general, when the vital actions which take place in the lungs are performed with due activity. The same sources of observation make us acquainted with the important facts, that the dilution of the atmosphere, which contains the causes of febrile diseases floating in it, by free ventilation; that the destruction, or neutralisation, or counteraction, of these causes, by the evaporation of certain disinfectant and stimulating agents; and that a due energy of all the vital and secretory functions, with an equal state of the mental powers and manifestations, and with a steady confidence; are the most successful means of preventing the attack and diffusion of those maladies.

10. By combining these facts as to the source, mode of operation, and methods of counteraction, of the chief causes of a most important class of maladies, and by directing the measures they suggest as far as may be according to the peculiarities of individual cases and diseases, we are thereby enabled to furnish persons, and even whole communities, with instructions and means calculated either to counteract or to lessen the dangers to which they are exposed.

11. 3d. *Of absorption from the alimentary canal, in connection with the causation of disease.*—a. It may be received as a pathological axiom, that the rapidity and extent with which deleterious matters are absorbed from the digestive mucous surface, as well, indeed, as from the respiratory, and other organs of the body, are nearly in pro-

portion to the depression of the nervous energies and vital resistance of the system. The truth of this is evinced in respect not only of the actions proceeding on the mucous surfaces, but also of those taking place in the different organs and structures. It is necessary to allude here to the numerous agents which cause, counteract, or remove disease, by their being absorbed from the alimentary canal. Whilst many agents produce their effects chiefly by modifying the states of the nerves and mucous tissue of this canal, others act principally from being absorbed, either by the lacteals, or by the venous radicles, and carried into the circulation; and a still more numerous class seem to operate through both channels, impressing immediately the nerves and tissues to which they are applied, and subsequently being absorbed into the blood, where they produce important effects not only upon this fluid, and on the vascular system, but also upon the functions of various secreting organs, especially those by which they are eliminated from the body.

12. A very large proportion, therefore, of the ingesta, whether alimentary, medicinal, or poisonous, thus acting upon the system chiefly through the medium of absorption, the importance of directing a considerable portion of attention to this function in our pathological investigations, as well as in the appropriation of medicinal means, must be apparent. Besides these more obvious relations of the subject, there are others which have been either imperfectly investigated or entirely overlooked. To these I can merely allude; but amongst the most interesting are the absorption of unwholesome and imperfectly digested chyle from the intestinal surface; the absorption of a portion of the vitiated secretions which occasionally accumulate in the alimentary tube, particularly in the cæcum and cells of the colon; the absorption of some part of the fecal matters, when they are long retained in the above situation, as evinced by the sensible qualities of the perspiration, foul state of the skin, &c., or of the obstructed and accumulated urinary secretion, as proved by similar phenomena; the passage of bile into the circulation, when it has been retained in the liver, the biliary ducts, or gall-bladder, from torpor or obstruction of these parts, or when it is secreted in large quantity, and does not readily pass off with the egesta. All these are very fruitful sources of disease; and, although generally connected with some degree of pre-existing disorder, or of torpid function, they are often the efficient aggravating causes of many of the maladies we are called upon to treat, from the constitutional and visceral disturbance they occasion and perpetuate.

13. There are few disorders which implicate the digestive and chylipoietic organs, and very few febrile diseases, which do not, at some period of their course, evince signs of the absorption into the circulation of a portion of the morbid secretions or fecal fluids retained in the alimentary canal, when due evacuations are not practised. Therefore, besides the other effects produced by medicines of this class, the due evacuation of these secretions and fecal matters from the *prima via* is one of the best offices they perform.

14. *b.* It is unnecessary to do more than to allude to the advantages that accrue to the scientific practitioner from some knowledge,—although, in the present state of medicine, necessa-

rily imperfect,—of the remedies which act by being absorbed, either altogether or in part, from the alimentary canal. Most of those substances which are found by experience the most efficacious in promoting the actions of the different secreting viscera, and in producing a marked and permanent change of the general state and functions of the economy, operate after having been absorbed into the circulating current, and conveyed through this channel to vital and secreting organs; and, although, during the healthy performance of the secreting functions, or whilst the vital energies are not far reduced, these substances seldom accumulate in the blood so as to be detected in it by chemical analysis, owing to the balance which is preserved between the rapidity of absorption and the activity of elimination, yet their passage through it is proved by the fact, frequently observed in regard to all of them, of their being found in the secretions of the eliminating or depuratory organs. This fact was established by experiments performed by myself,—some of them as far back as 1819,—and published in several periodicals in 1821 and 1822.

15. 4th. *Of absorption from diseased organs and structures.*—*a.* When morbid secretions are generated, or accumulated in any organ or texture, or when any part is changed in such a manner as to secrete a matter different from the healthy constituents and fluids of the body, the matter formed is generally, after a while, absorbed into the circulation, and contaminates, in a more or less marked manner, according to its nature, the other fluids, and the soft solids, and thereby at last destroys life. Illustrations of this procedure are furnished us in the pathological history of internal and deep-seated abscesses; in some morbid states of the uterus; in scirrhus-cancer, fungous hæmatodes, and other malignant diseases. The celerity with which the absorption of the morbid matter and the contamination of the frame proceed, is generally according to the principle already recognised (§9.),—in proportion to the diminution of the vital energy and resistance of the constitutional powers.

16. *b.* The commencement of the contamination can scarcely be determined by an appreciation of symptoms: but the experienced observer will readily recognise, in the colour of the surface of the body; in the state of the heart's action, and of all the circulating functions, as well as in the blood itself; in the failure of the energies of life; in the morbid condition of the nervous functions and of the powers of the stomach, and indeed of the whole digestive canal, sufficient proofs of the early, as well as of the advanced progress of disease, arising from the absorption of morbid matters from the primary seat of morbid action, and the consequent vitiation of the circulating fluids, of the soft solids, and of the secretions and excretions of the body. (See *Art. Blood.*)

17. In many of the more chronic diseases which either commence with or terminate in the malignant state, this contamination is frequently first evinced by the tumefaction and pain of adjoining lymphatic glands, owing to the irritation produced by the morbid fluid conveyed into them: the inflammation or obstruction thus produced in them becoming an obstacle to the rapid transit of the morbid matters from the original seat of disease into the circulation. But in many cases this is an

insufficient barrier; and in others, these matters seem to pass onwards, either without circulating through lymphatic glands, or without occasioning irritation, obstruction, or inflammation in them; or are almost directly conveyed into the venous circulation. Whatever may be the channel of conveyance, there can be no doubt of the fact—the practical importance of which is very great—that the rapidity of the absorption of morbid matters, and extent of their hurtful effects on the constitution, are in proportion to the depression of the vital energies of the frame,—this depression being frequently the cause of their absorption, particularly in respect of puriform fluids; or at least the circumstance which more especially favours its occurrence, and the rapidity of its progress.

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ABSTINENCE. Its Morbid Effects. SYN. *Abstinencia*, Lat. *Asinenza*, Ital. *Die Enthaltung*, Ger. *Abstinence*, Fr. *Starvation from Hunger*.

CLASSIF. I. CLASS, V. ORDER (Author, see *Classification in the Preface*).

1. It does not come within the scope of this work to enter upon the consideration of the therapeutical relations of abstinence; but that the practitioner should be acquainted with the states of disease which it occasions, and with the best means of treating it, is extremely important; more especially as, when it is too rigidly enforced during the treatment of several diseases, it not unfrequently gives rise to effects of a serious nature, which not infrequently have been mistaken for the spontaneous course of the malady.

2. OF THE MORBID EFFECTS OF ABSTINENCE.—Abstinence has been long employed as a means of cure, and generally as a part of the antiphlogistic regimen, in a very great number of diseases, particularly in fevers and inflammatory affections. Very great difference, however, exists both among writers and practitioners as to the extent to which it should be carried, and the maladies in which it ought to be prescribed. As to its applicability to the class of diseases now noticed, there is no doubt: but in disorders of debility, or of irritation merely, particularly those which occasionally simulate chronic inflammation, and in various nervous affections, it is extremely injurious; and I believe that it has been carried to a hurtful extent in many of these affections, particularly by BROUSSAIS and his followers, as indeed has been recently well shown by MM. PRONNY and BARRIAS. A case of this description, which had been long under the care of M. BROUSSAIS, very lately came before me, with many of the morbid effects of this practice, which had been carried to a hurtful extent. There can be no doubt, however, that it is extremely beneficial, when carefully watched and regulated, in many of the diseases of the stomach and its associated viscera; but the fact is equally incontrovertible, that it will often produce effects very nearly resembling those for which it has been prescribed. The importance, therefore, of keeping these effects in recollection, when treating several diseases, particularly those of irritation and debility, must be apparent.

3. In appreciating the usual effects of abstinence it is extremely requisite to be aware of two things: 1st, That the effects vary with the state of the patient at the time that abstinence is endured; 2d,

that they differ materially according to the suddenness with which it is entered upon, the extent to which it is carried, and the circumstances with which it is associated. By very corpulent and plethoric persons, abstinence is generally borne well for a long period, and by those labouring under febrile or inflammatory excitement; and it is, in them, one of the most necessary means to diminish the one and lower the other. In these, particularly the latter, total abstinence may be endured for many days; whilst, if carried to the same extent in healthy persons, its effects would be fatal, or nearly so. Abstinence, also, is longer endured by persons of the middle or matured epochs of life, than by those of an early age.

4. That the absolute or sudden deprivation of food should be productive of more rapidly serious effects is very obvious; but it is not so well known that there are circumstances, which modify the effects of the less absolute states of abstinence, and which, when thus combined, give rise to very important and dangerous diseases. In order to place the subject more clearly before the reader, I will first notice the effects of abstinence simply, and unassociated with other causes of disease; and next, the morbid conditions, which its association with certain influential agents usually occasions.

5. 1st. *The morbid effects of simple abstinence.*

— Depending upon the extent to which deprivation of nourishment is carried, and the age and state of the person at the time of its adoption, I may briefly describe the morbid effects of abstinence as follows.—Paleness and languor of the countenance; muscular debility and emaciation; a weak and small pulse; thirst; at first quickness of intellects, constipation, and flaccidity of the muscles. To these succeed increased frequency of pulse, palpitations, alternating with leipthymia, or even full syncope; headach or delirium; flashes of light before the eyes; tinnitus aurium; slight amaurosis; parched state of the throat, and thirst; pains in the stomach; great wakefulness, followed by delirium, sometimes mild, but in other cases furious, or at first mild or muttering, and afterwards strong or furious; sinking of the animal heat, or alternate coldness and burning in parts of the body; and lastly, morbid sensibility of the organs of sense and surface of the body, and greatly depressed temperature, followed by insensibility, stupor, or coma, terminating in death.

6. It is obvious that the severity and duration of these symptoms will vary in different cases, according to circumstances peculiar to each. But it is not so well known that they will be actually produced by pursuing a too rigid abstinence in the treatment of various diseases, and particularly when the nature of the disease is mistaken: as when the irritative symptoms frequently attendant upon diseases of debility, or on nervous affections, are viewed as resulting from inflammation.* Many cases have occurred to me in the course of practice, where the antiphlogistic regimen, which had been too rigidly pursued, was itself the cause of the very symptoms which it was employed to remove. Of these symptoms, the affection of the head and delirium are the most

remarkable, and the most readily mistaken for an actual disease requiring abstinence for its removal. A case of this description lately occurred to me. A professional man was seized with fever, for which a too rigid abstinence was enforced, not only during its continuance, but also during convalescence. Delirium had been present at the height of the fever, and recurred when convalescent. A physician of eminence in maniacal cases was called to him, and recommended him to be removed to a private asylum. Before this was carried into effect, I was requested to see him. A different treatment and regimen, with a gradual increase of nourishment, were adopted, and he was well in a few days, and within a fortnight returned to his professional avocations.

7. *The morbid appearances* observed after fatal cases of deprivation of food possess some interest. The most remarkable are the emaciation and absorption of every particle of fatty matter: the paleness, flabbiness, softening, and emaciation of the voluntary muscles, and of the substance of the heart; an exsanguined and pale state of the viscera; slight atrophy of the liver and spleen; diminished size of the stomach and colon; and particularly the increased vascularity of the brain, and sometimes of the membranes also, compared with the other viscera. It would seem that a very large proportion of the blood continues, as in many cases of great vascular depletion, to be sent to the brain to the very last. This is obviously owing to the pressure of the air on all parts of the body, from which the encephalon is guarded by its unyielding case. In addition, also, to the vascularity of this part, a limpid serous effusion between the membranes, or in the ventricles, is sometimes met with.

8. 2d. *Of the morbid effects of abstinence when it is associated with other hurtful agents.*—These effects are occasionally presented to medical men under a variety of circumstances, and from a varied combination of causes; but in the great majority of instances they result from deficiency of food merely, rather than from a rigid abstinence, conjoined with the depressing influence of cold or insufficient clothing, great or continued exertion, or with a moist and unwholesome atmosphere. Thus we find the association of these causes, particularly insufficient or unwholesome food, laborious exertion, mental depression, a moist, cold, or unwholesome atmosphere or locality, not unfrequently give rise to purpura, hæmorrhagica, scurvy, scorbutic dysentery or diarrhoea, low or typhoid fevers, affections of the brain and nervous system, emaciation, with chronic ulcerations, &c.—effects which have received a particular notice in their respective articles.

9. The best illustration of the effects of this association of other agents with a continued deficiency of food is furnished by the diseases which appeared a few years ago in the Milbank Penitentiary. The prisoners confined in this prison were suddenly put upon a diet from which animal food was nearly altogether excluded, excepting in as far as it entered into the composition of a weak soup. They were at the same time subjected to a low grade of temperature, to considerable exertion, and confined within the walls of a prison situate in the midst of a marsh which is below the level of the adjoining river. • The consequences were, first, loss of colour, of flesh and

strength; subsequently, diarrhoea, dysentery, scorbutic dysentery, scurvy; and, lastly, low atactic or adynamic fevers, or headach, vertigo, convulsions, delirium or mania, apoplexy, &c. The smallest loss of blood produced syncope or leipthymia, and fatal results. Yet, in the great majority of the fatal cases, independently of the lesions observed in the mucous surface of the digestive tube, or in other situations, increased vascularity of the brain and its meninges, frequently with effusion of fluid in the ventricles or between the membranes, was found upon examination after death.

10. *The Treatment of the morbid effects of abstinence* is very obvious, yet considerable care is necessary to its successful issue in very urgent cases. Nourishment should be administered cautiously, in a very small quantity at a time at first, but frequently. It ought to be bland and farinaceous; animal food may be entered upon subsequently, and the quantity gradually increased. The animal warmth should be promoted, at the same time, by the usual external means—by frictions and warm applications; and the bowels assisted by the occasional use of bland enemata. Soups may be allowed early in the treatment, but in a small quantity at a time. Milk is often prejudicial, unless diluted and made into gruel with some of the farinaceous articles of food. Internal stimulants are seldom required; unless when symptoms of cerebral or nervous irritation exist, when they may be given; particularly the preparations of ammonia, the æthers, camphor, vegetable bitters and tonics, at first in very moderate doses, in conjunction with small quantities of an anodyne, as the extract of hop, the extract of hyosciamus or of opium, the pægoric elixir; and by warmth, frictions, and stimulating applications to the cutaneous surface and lower extremities. These means will generally succeed in removing the effects of simple abstinence whilst they admit of removal. The treatment of the effects resulting from the conjunction of other causes with the one now discussed, is considered under their respective heads.

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ACNE. 'Ακνῆ. Derived, according to Cassius (*Nat. et Med. Quest.*, &c., Pæb. 33.), from 'ακνῆ. SYN. *lorbos*, Gr. *Varus*, Lat. *Psudocis* Acne, Sauv. *Gutta Rosea*, Darwin. *Imthuss*, Good. *Bouton*, Couperose, Fr. *Die Finnen*, Ger. • *Carbuncle*, *Stone-pock*, *Whelk*.

• CLASSIF. 3. *Class*, Diseases of the Sanguineous Function; 2. *Order*, Inflammation (Good); 7. *Order*, Tubercles (*Willan* and *Hateman*). IV. CLASS, IV. ORDER (Author, see the Classification).

1. *DESN*. *Hard*, inflamed, tubercular tumours, suppurating very slowly, occurring chiefly in the face; sometimes, also, on the neck and shoulders.

2. One or more, sometimes a number, of these tubercles appear, generally in succession, in the face, and sometimes on the neck, shoulders, and

breast, but never lower; remain permanent for a considerable time; and suppurate slowly and imperfectly, leaving a dark or livid mark, which gradually disappears. They occur chiefly in persons of the sanguine temperament; commencing at the period of puberty, and generally disappearing after thirty or thirty-five. They are common to both sexes, but are most frequent and numerous in the male sex.

3. This is one of the most constant and unvarying in its characters of any of the affections of the skin; but writers upon this class of diseases differ widely in respect both of its particular character and seat. WILLAN, PRENCK, BATEMAN, and THOMSON consider it a tubercular affection; whilst ALIBERT, BIERT, and RAYER view it as pustular. I believe, however, that both opinions are in some respects correct; and that in certain forms or states of acne the tubercular change is predominant, little or no suppuration taking place, but a state of slow inflammation giving rise to a continued exfoliation of the cuticle, or formation of thin scabs on their apices; and thus they slowly disappear; whilst in others the pustular character is very distinct, but always preceded by the characteristic tubercular hardness. This affection may be viewed, therefore, as forming an intermediate link between the tubercular and pustular eruptions.

4. In respect of the particular tissue in which this disease is seated, some difference of opinion also exists. The greater number of writers on the pathology have considered this disease to be seated in the proper structure of the cutis vera; many of them admitting, at the same time, an affection of the sebaceous follicles very nearly resembling it. Mr. PLUMBE, however, attributes it entirely to obstruction and chronic inflammation of these follicles. I believe that this opinion is too restricted; and that, whilst one form of acne evidently depends upon this cause, others are essentially disease of the cutis vera.

5. SPEC. I. ACNE SIMPLEX, *Simple Acne*. Syn. *Gutta Rosea Hereditaria*, Darwin. *Dartre Pustuleuse Miliare*, Alibert. *Ionthus varus simplex*, Good.

Simple acne affects most frequently young subjects, at the period of puberty, and particularly females. They generally appear on the forehead, shoulders, and upper part of the thorax, and are liable to recur at the menstrual periods, especially in cases of dysmenorrhœa. Many of these vari do not proceed to suppuration, but slowly subside. They are very commonly developed in succession; commencing with small, hard, and inflamed tubercles, of the size of a pig's head. These continue to enlarge for three or four days, and the inflammation becomes more apparent. In seven or eight days they have reached their greatest size. They are then dark red, smooth, prominent, shining, hard, and slightly painful to the touch. After two or three days a small speck of matter appears on the apices of some of them; and when these break, a thin humour exudes from the tubercular induration, and dries on its surface, forming a thin scab, which adheres firmly; but, after a few days, is loosened at the edges, and falls off; the tubercular hardness and livid redness gradually subsiding, and disappearing after three or four weeks.

6. In some persons this eruption recurs fre-

quently at short intervals, the vari being more or less numerous; in others it is more extensive, and never altogether disappears, although it is more troublesome at one time than another. When the vari are numerous, many of them undergo no suppuration; but the sebaceous glands are often excited, giving the skin a greasy appearance. In many of these cases, several of the vari assume the characters of the next species.

7. SPEC. II. ACNE INDURATA, *Stone-pock*.

The tubercles are larger, more indurated and permanent than the foregoing; and are apparently the consequence of a slower and more deep-seated inflammation. They often appear in considerable number, of a conical or oblong-conoidal form; some of them assuming a roseate hue, and tending to suppuration at their apices; others remaining in a hard, elevated state for a very long time, without any appearance of the suppurative process, or disposition towards it. In some cases, two or even more of them coalesce, and occasionally suppurate at their respective apices; but one only may undergo this change. As they continue they become more purple or livid, particularly when they have no tendency to suppurate. When they experience this process, the same process of scabbing and exfoliation, already described (§ 5.), is gone through; but it sometimes happens that when they experience any irritation they may suppurate a second time. As they very slowly subside, they leave a purple or livid discoloration, and, occasionally, a slight depression, which is long in wearing off, and which sometimes never altogether disappears.

8. This species of acne generally is most frequent and numerous along the rami of the lower jaw, on the temples, the nose, and cheeks; also on the back and neck. They are frequently accompanied by a greasy state of the skin, from an excited state of the cutaneous follicles; are commonly sore and tender to the touch; and, when numerous, are in every stage of progress, giving the surface a spotted and variegated appearance,—owing to the prominence and redness of some at their commencement, to the yellow points in those that are suppurating, to the scaly crusts covering those which have undergone this process, to the lividity of those that have exfoliated or are subsiding, and to the discoloured depressions which others have left after them.

9. The general health seldom suffers materially from either the simple or the indurated acne, excepting as far as regards some pre-existing and concomitant disorder of the digestive functions. If fever, or acute disease, attack persons affected with these eruptions, the vari generally disappear; but they frequently also re-appear upon its subsidence, becoming in some respects a critical eruption.

10. SPEC. III. ACNE ROSACEA, *Rosy-drop*.

Syn. *Gutta Rosea*, Auct. var. *Gutta Rosea Hepatica*, Darwin. *Ionthus Corymbifer*, Good. *Dartre Pustuleuse Conperose*, Alibert. *Goutte Rose*, *Conperose Rougeurs*, Fr. *Kupferbandel*, *Roth-nase*, Ger. *Carbuncled Face*, Eng.

The first and second species, described above, might have been, with propriety, viewed as varieties of the same species; but this is a very distinct species from the preceding. It consists of small, slowly suppurating tubercles, accompanied

with a shining redness, and an irregular granulated appearance of the skin of the part affected. This species commonly appears first at the end of the nose, and afterwards spreads from both its sides to the cheeks, which it never altogether covers. At first it is not uniformly red; but is pale in the morning, and intensely red whenever the patient is excited or heated, and particularly after dinner, or drinking wine or spirits. After some time the texture of the cuticle is gradually thickened, and its surface granulated and variegated by the ramifications of cutaneous veins, and the suppurative of small, prominent vari, which successively arise in different parts of the nose and face.

11. This species of acne seldom appears before the age of forty, excepting in those addicted to the immoderate use of vinous or spirituous liquors, or who possess great hereditary predisposition to it. In advanced life, or in the worst of these cases, it sometimes spreads to the greater part of the face, even to the forehead and chin. The nose usually becomes very tumid, and of a fiery red colour, and sometimes is enlarged to an enormous size. The nostrils, in these cases, are generally distended, and their ala often fissured and divided into lobes. In advanced age, this species of acne becomes more livid; and if any of the tubercles suppurate, they often ulcerate, and are indisposed to heal. In younger persons, who are attacked herefrom hereditary disposition, it is often accompanied with irregular red patches on the face, which are often smooth, devoid of tubercles, and accompanied with occasional slight exfoliations of the cuticle. These patches are extended, or aggravated, by intemperance in food or drink.

12. Spec. V. ACNE PUNCTATA, Maggot Pimple. Syn. *Crimones*, Auct. var. *Punctæ Mucose*, Darwin. *Ianthus Varius punctatus*, Good. *Der Cries*, Ger. *Tannes*, Fr. *Grubs*, Eng.

This is, in my opinion, the only species of acne which is seated in the follicular glands; and, although often observed as the only form of eruption, it also is frequently found intermingled with the species already described, particularly the first and second. It consists of a number of black points, surrounded by a very slightly elevated border of cuticle, proceeding from concreted sebaceous matter accumulated in the glands and their ducts, whence it may be squeezed out in a vermicular form, the external extremity being dark from its exposure. In consequence of the accumulation and distension, these glands sometimes become inflamed, and give rise to small tubercles, with minute black points in the centre of their external surface. These tubercles suppurate partially, as the preceding, whilst others remain stationary for a considerable time, and several are distended without even being inflamed. They are not infrequently mixed with tubercles without the black punctæ, which are evidently owing to a similar obstruction, and to a more complete closure of the outlet of the duct. In this species of acne the accumulated secretion may be squeezed out.

13. Spec. V. ACNE SYPHILITICA, Venereal Acne. Syn. *Gutta Rosea Syphilitica*, Plenck. *Syphilide Pustuleuse Miliare*, Alibert.

Amongst the very numerous forms of cutaneous affection in which secondary syphilis may manifest itself, this may be enumerated as one,

although not a common one. PLENCK has given a very correct description of it. This species nearly resembles, in the size and form of the pustules, the acne rosea. It chiefly affects the forehead, face, neck, and upper part of the trunk. The vari are round and conical, with an inflamed, copper-coloured, tubercular base and areola. They suppurate slowly at their apices, where a yellowish brown scab is formed; and leave a dirty, dark, and slightly depressed mark. They present a darker colour, and more permanent tubercles, on the nose, the adjoining parts of the cheeks, and forehead, than elsewhere; and are there observed in discoloured patches, in every stage of their growth. They are frequently found complicated with other eruptions, chiefly of a scaly character, on different parts of the body; are always a secondary venereal affection; and, although sometimes unaccompanied with other syphilitic symptoms, are most commonly attended with ulcerations in the throat, with nodes, inflammation of the periosteum, and nocturnal pains.

14. DIAGNOSIS. — Acne can be confounded only with *ecthyma*. The tubercular pustules of the former, however, are small, slowly developed, with an indolent and hardened base; whilst the pustules of *ecthyma* are large, superficial, unaccompanied with chronic induration, and forming thick scabs, more or less prominent, much less adherent, and such as never are formed in acne. The characters of *syphilitic acne*, the antecedent and accompanying symptoms (§ 13.), the colour and predominance of the eruption about the nose and commissures of the lips, the tendency of the vari to ulcerate, and the associated affection of the throat, and sometimes of the periosteum, sufficiently mark the nature of this species of the disease.

15. The Prognosis of acne regards merely the persistence of the eruption, and the inconvenience attendant on it. Acne *simplex* and *punctata* are often of comparatively short duration. The acne *indurata* is much more tedious; and in some constitutions will resist, even for many years, every mode of treatment, particularly if the causes in which it not infrequently originates be overlooked. Acne *roseacea* is seldom or ever cured, excepting by a strict attention to regimen.

16. The Causes of acne are extremely various. The species *simplex*, *indurata*, and *punctata* usually occur during youth, in the sanguine and bilious temperaments, and disappear about middle age. They are very generally connected with chronic affections of the stomach, bowels, and liver; with hæmorrhoids; in some, with a tendency to phthisis; and in females, with painful and scanty menstruation. These species, as well as the acne *roseacea*, evidently arise, in many cases, from hereditary predisposition; and are most common in cold and moist climates, — probably owing to the use of ardent spirits. Excesses at table, cold indigestible articles of food, sedentary habits, fits of passion, anxieties of mind, and the depressing passions, cold drinks — particularly if taken when the body is overheated — the use of irritating cosmetics, and disorder of the digestive functions, are very common causes of these eruptions. I believe, however, that the simple, indurated, and punctated species of acne are most frequently occasioned by uterine irritation,

and excitement, or an imperfect performance of the uterine functions; by constipation; by torpid conditions of the liver; and by the injurious addiction to onanism.

17. TREATMENT.—In the treatment of these affections, our chief attention ought to be directed to their pathological relations and causes. These latter must be removed as far as may be done; and the former should both guide our indications, and direct our means of cure. The apprehensions entertained by the older writers, of producing internal disease by the sudden repulsion of the eruption, were founded on the results of observation, although explained by partially inaccurate and unsound pathological views. Affections of the stomach, bowels, chest, and head, have been thus induced, and been relieved upon a re-appearance of the eruption: but such consecutive diseases are more common after the repulsion of other eruptions. We should, however, as being both the safest and the most permanent method of cure, direct our remedies to the constitutional or internal relations, as well as to the external manifestations of disorder.

In the treatment of this, as well as many other diseases, the causes, the state of the habit and constitution of the patient, its morbid relations, and its duration, are severally to be kept in recollection.

18. 1st. *Treatment of acne simplex.*—In delicate constitutions, the chief attention should be directed to the state of the digestive functions. These should be promoted by gentle aperients, combined with tonics, and the functions of the skin promoted, by preserving a free transpiration on its surface. With this view, sulphur may be combined with magnesia, or with cream of tartar, and confection of senna, and taken in a sufficient dose, at bedtime, to procure a full evacuation in the morning, or any one of the formulæ (Ar. Nos. 82, 89, 98.) may be had recourse to. These may be occasionally changed for a powder with rhubarb, sulphur, and magnesia, or for the extract or decoction of taraxacum, with subcarbonate of soda or sulphate of potash. If the functions of the liver are torpid, the following may be taken for a few nights:—

No. 6. R. Pilul. Hydrarg. Submur. Comp. ʒj.; Felli. Tauri Inspiss. gr. xv.; Saponis Castil. gr. x.; Extr. Taraxaci ʒss. M. Fiant Pilulæ xviii. quarum capiat binas vel tres horâ somni.

After the bowels have been evacuated, and the secretions brought to a healthier state, the dilute mineral acids, either alone or with bitter infusions, may be taken through the day.

19. When the eruption occurs in young plethoric persons, and when it is in females attended with scanty and difficult menstruation, small blood-lettings may be practised; in the latter, by the application of leeches to the superior and internal parts of the thighs. In more delicate females the functions of the lower bowels are to be promoted by the pilula aloës cum myrrha, combined either with pilula ferri composita, or with the extractum gentianæ. When the eruption is obviously connected with imperfect and painful menstruation, the use of the warm salt water *hip-bath*, or of the hip vapour bath, or warm salt water *pediluvia*, after the application of a few leeches to the insides of the thighs, will be extremely serviceable. In such cases, the internal exhibition of the *sub-borate of soda*, either in the form of pill or draught,

combined with camphor, the *extractum taraxaci*, or the *extr. rutæ*, or, as directed in Form. Nos. 93, 184, 209, 254, will be found of great advantage.

20. In addition to these internal remedies, which require to be varied according to different pathological relations of the eruption, external applications will be necessary; and when conjoined with the above treatment, or employed subsequently to it, no dread may be entertained of any injurious consequences from them. The ancients, particularly CRISUS, PLINY, AETIUS, PAULUS, ALEXANDER, &c. recommended lotions and liniments with vinegar and honey; and these sometimes combined with turpentine, emulsion of bitter almonds, myrrh, alum, soap, Cymolian earth, the bruised roots of the lily, the cyclamen, narcissus, and the fruit of the wild vine; the most of them calculated to be advantageous in many states of the common forms of acne.

21. If the tubercles are much inflamed, and inclined to be pustular, mildly stimulating applications are most serviceable, as *dilute spirit*, or the *pyroligneous acetous acid*, or *liquor ammoniæ acetatis*, with rose or elder-flower water. In the more indolent cases, or when the skin can bear an augmented stimulus, WILLAN and BATEMAN recommend from half a grain to a grain, or more, of the *muriate of mercury*, in each ounce of the vehicle; or a drachm or more of the *liquor potassæ*, or of the *muratic acid*, in six ounces, and THOMSON advises that the emulsion of bitter almonds, containing ten minims of *hydrocyanic acid* to each fluid ounce of the emulsion, should be the vehicle adopted. The solution of the *sulphuret of potass*, in the proportion of a drachm to twelve or sixteen ounces of water, may also be employed; and, in the more obstinate cases, the *baths* directed in Form. No. 14—17, may be had recourse to. The solution of the *muriate of ammonia*, either alone or with the chloride of mercury, is often serviceable.

22. The lotion from which I have derived the greatest advantage in practice, and which I have found the most generally applicable, is a solution of the *sub-borate of soda* in rose or elder-flower water, or in water which had been poured in the boiling state over sulphur, and allowed to infuse for ten or twelve hours. The borax may also be dissolved in equal quantities of elder-flower water and honey, and used as a lotion in the more chronic cases.

23. 2d. *Treatment of acne indurata.*—In young and plethoric subjects, or in females, when the eruption is accompanied with a scanty and painful menstruation, the treatment already pointed out (§ 19.), should be put in practice. When we suspect that sexual irritation or masturbation is connected with the causation of the eruption, early rising, mental occupation, the use of gentle cooling aperients, of soda combined with small doses of camphor, soda water, sulphur with soda or antimony, are the most serviceable internal remedies. After these, the mineral acids, the sulphureous mineral waters, and gentle vegetable tonics, will be useful. Where the eruption is dependent upon torpid function of the stomach, or liver, or bowels, mild alteratives, exhibited at bedtime, as the pills already prescribed (§ 18.), and gentle tonics through the day, will be required. In a most obstinate case, which some time ago came before me in a lady, whom all the prac-

tioners who had acquired a reputation in the treatment of cutaneous affections had attended, strict attention to the state of the digestive and uterine functions removed the eruption. The following electuary has sometimes been used by me in this and other obstinate cases.

No. 7. R Potassæ Supertart. in pulv. 3j.; Sub-boratis Sodæ 3jss.; Sulphuris Precip. 3ss.; Confectionis Sennæ et Syrup. Zingiberis aa 3jss. M. Fiat Electuarium, cujus capiat Coch. unum minimum omni nocte.

At the same time a solution of two grains of the chloride of mercury in four ounces of the compound tincture of cinchona was prescribed, and a teaspoonful of it directed to be taken twice daily, in half a glass of infusion of camomile flowers. The lotion already recommended (§ 22.) was also employed. In cases similar to this, and, indeed, in all those accompanied with disorder of the digestive functions, cold or drastic purgatives ought to be avoided; and the bowels should be regulated with the pilula aloës cum myrrha, combined with a little blue pill, or with the pill prescribed above (§ 18.); or the ext. aloës purif. conjoined with the extr. gentianæ; or the electuary now directed. Advantage will also be obtained from a draught of infusion of cascarrilla, or of calumba, with subcarbonate of soda or potass, or the liquor potassæ, taken twice a day.

24. As to *external applications* in this form of acne, little need be added to what has been already stated. The lotions with the chloride of mercury or with the borax, are most to be depended upon, particularly when dissolved in an emulsion of bitter almonds, or in camphor mixture, with the addition about twelve minims of the hydrocyanic acid to each ounce of the vehicle. In cases where the tubercles have at all suppurated, it will be advisable to open them with the point of a lancet before the lotion is used.

25. At the commencement of the eruption, mild emollient poultices and fomentations are useful; and afterwards, particularly in the more obstinate cases, M. BIETZ, and after him MM. CAZENAVE and SCHÜDEL, recommend the following ointments to be used, in order to promote the resolution of the tubercles:—

No. 8. R Protochlor. Hydrarg. et Ammoniac* (Submur. Hydrarg. et Ammon.) 3j.—3j.; Axungie 3j. Misce.

Of this ointment I have had no experience; but the following I have employed with advantage in several chronic eruptions, and in two cases of this species of acne:—

No. 9. R Sulphureti Iodine gr. xij. xxiv.; Axungie 3j. M.

AMBROSE PARÉ and DARWIN considered that blistering successively small portions of the face was the most successful means of ridding it altogether of this very obstinate eruption. This practice has been employed at the hospital St. Louis, by M. BIETZ, with great benefit. When the disease has disappeared, this scientific physician has derived great advantage from a douche of cold sulphureous water in preventing a return of the eruption.

26. 3d. In treating the punctated species of acne, it will be frequently necessary to press out the accumulated and hardened matter from the follicles. The vapour bath, the warm sulphur bath, followed by friction either with a coarse

towel or a flesh-brush; and lotions such as have been already recommended, or a weak solution of pure potash, or of ox-gall, or of sulphuret of potash, also followed by frictions, are particularly indicated in this species of acne.

27. Internally, the solution of the carbonate of potash, or the oxy muriatic acid, advised by LINDENWOOD and WILLAN, may likewise be employed. Sulphur, magnesia, soda, rhubarb, and the sulphate of soda, are also of much benefit. Dr. THOMSON states, that he has seen the skin completely cleared by the use of the following alkaline tonic for six weeks; at the same time regulating the bowels:—

No. 10. R Zinci Sulphatis gr. xxiv.; Liquoris Potassæ f. 3xj. Solve. Sumantur guttæ xxx. ex cyatho aquæ usque quotidie.

It ought always to be observed, as a general principle, in this as well as in the other forms of acne, that attention to the secretions of the abdominal viscera, and to the general health, by promoting the digestive functions, will of itself, independently of external means, go far in promoting a cure; and that, without such attention, no cure will be permanent.

28. 4th. The treatment of *acne rosacea* is generally unpromising. It should always have a strict reference to the particular nature of the affection of the liver, or digestive canal, or both, with which this eruption is associated, and in many respects symptomatic. A. rosacea often precedes serious disease of the liver, more frequently co-exists with it, and most commonly indicates a congested and obstructed state of the viscus. To this organ, therefore, ought our remedies to be particularly directed. A moderate blood-letting; the application of leeches on the region of the liver; and, if the eruption occurs in females, and is attended with obstructed or scanty menstruation, leeches also to the upper part of the insides of the thighs, or bleeding from the feet, and stimulating pediluvia, or the hip-bath; the use of mild mercurials, or alternative and deobstruent medicines, such as the pills previously prescribed (§ 18.); the blue pill, or the hydrargyrum cum creta with soda and taraxacum; Harrogate, Bâle, and other sulphureous mineral waters; the decoction of dulcamara, liquor potassæ, and chlorine or sulphureous fumigating baths; are severally of advantage in some cases. But from none of these will any permanent benefit be derived, unless the regimen presently to be noticed is rigidly observed, and the pathological relations of the eruption appropriately treated.

29. Blood-letting in this, as well as the foregoing species of the eruption, was strongly insisted on by AMBROSE PARÉ; and certainly in the cases pointed out as requiring this practice should never be omitted; more particularly when accustomed discharges have disappeared, as the hæmorrhoidal flux and the menstrual evacuation. In this form of the disease, much advantage will sometimes be procured from the nitro-muriatic acid foot-bath; and from a lotion with these acids applied to the affected parts twice or thrice a day (see F. 4, 5.). This practice has received the sanction of MM. BIETZ, CAZENAVE, and SCHÜDEL. The advantages to be derived from the use of these acids as a lotion will be more certainly secured by applying a few leeches to the vicinity of the eruption, and afterwards a fomentation, which may be followed either by a spirit and alum or zinc lotion, or by

* Prepared by subliming equal quantities of the corrosive sublimate and murias ammoniac.

the lotion with the sub-borate of soda (F. 834.). If these fail, the nitro-muriatic acid lotion may be employed. Stimulating and irritating applications ought to be avoided; and whilst the tone of the digestive organs and the secretions of the liver should receive the closest attention, drastic and cold purgatives are to be avoided.

30. 5th. The treatment of the syphilitic or specific form of acne must be directed as in other states of secondary venereal disease. At the same time, however, that the mercurial preparations are being exhibited, the external means which have been recommended may be employed, according to the particular form the acne may assume. The mercurial preparations should be combined with sarsaparilla or taraxacum, or both, and with small doses of antimony. The decoction of Feltz, which chiefly consists of a combination of these remedies (see F. 588.), is much employed in these eruptions on the Countenent, and may be taken to the extent of a pint and a half daily. When the tubercles remain long, the ointments formed with the iodurets of mercury or sulphur (F. 774, 775.) may be employed twice daily, and assisted by douches of vapour.

31. The diet and regimen of persons affected with acne, particularly the A. rosacea, ought to be carefully restricted. In the A. simplex, indurata, and punctata, the diet should be light, nutritious, and easy of digestion. Cold, raw, and indigestible vegetables, particularly cucumbers and melons, and very cold fluids, should be avoided. Moderate and regular exercise in the open air, and early rising, as tending both to promote digestion and invigorate the frame, are always of service. In the acne rosacea, more will often depend upon regimen, than upon the medical treatment of the patient. The careful avoidance of all its exciting and concurrent causes, and of excesses of every description, both in eating and drinking; the adoption of a mild farinaceous diet, with a small portion only of light and nutritious animal food, and of toast-water or barley-water for drink; shunning mental excitement and depression, as well as heating and fatiguing exertions; gentle and regular exercise, and attention to the promotion of the secretions and functions of the abdominal viscera; are essentially requisite to the removal of this very obstinate and often unquarable eruption.

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ADHESIONS. SYN. Adhæsions, Adhærences, Fr. Die Anhänglichkeit, Ger. Congiunctioni, unioni, aderenza, Ital.

CLASSIF. MORBID STRUCTURE. — THIN LAMEN-TICUS. Chiefly a result of some one of the Inflammatory States. — See INFLAMMATION.

1. Adhesions of opposite surfaces of tissues are amongst the most common organic lesions presented to our view in post mortem examinations. They may be congenital, arising either from an original disposition of parts, or from intra-uterine disease. As they are commonly brought before us in prac-

tice, they are generally one of the consequences of inflammatory action, affecting the adhering surfaces, or which had affected them previously; and occur in those parts which are in contact, or so nearly in contact, that the effusion of a common product of the inflammatory act becomes the medium of union.

2. It is requisite to all adhesions, that a fluid be thrown out from the inflamed surface, previously to the adhesion being commenced. This fluid varies somewhat in its characters with the state of inflammatory action; but it soon passes into a much more consistent condition, and thus becomes the medium of adhesion. In some places it is scarcely perceptible between those parts of opposite surfaces which are naturally very nearly or altogether in contact with each other, the agglutinating medium being there so remarkably thin; whilst those parts that are further separated in their natural state, have the interstices filled up by a copious exudation. The fluid exuded in thus variable quantities, has been denominated, in its first stages, or inorganised states, coagulable and coagulated lymph, albuminous exudation, coagulated albumen, &c. When first poured out from the inflamed surface, particularly of serous membranes, it consists of a lymph-like fluid, which soon becomes somewhat opaque, more solid, and assumes the appearance of a softly coagulated albumen, - its chemical properties very nearly approaching to those of pure albumen, containing a small proportion of the usual saline ingredients of the blood.

3. The longer this matter has been effused, and the longer adhesions, which it has occasioned, have endured, the more firm and more closely resembling cellular or cellular-fibrous tissue do they become. This change in the state of the adhesions, according to their duration, is fully stated in the article on the morbid states of serous membranes. It may, however, be here premised, that the medium of adhesion, which is first fluid, and afterwards albuminous and nearly solid, soon becomes partially organized; blood-vessels shoot into it, and thus opposing surfaces become more or less firmly united, according to the degree of motion occurring between them, that may either prevent their firm adhesion, or disturb it after it has been already formed, and to the state of the fluid which becomes the medium of union. In some cases this fluid is secreted so copiously, and is so deficient in the albuminous constituent, the watery part being so predominant, that adhesions are formed only in different, or in numerous and irregular points, between which serum in various states is effused, separating the opposite and partially united surfaces, stretching the adhesions, breaking down some, and reducing others to cellular bands running between these surfaces through the effused fluid, which is in such cases usually very turbid, and abounds in flakes of albuminous matter. This appearance is not unusually observed in cases of adhesion of the pleura, pericardium, and occasionally of the peritoneum.

4. The concrescible fluid, as will appear in the sequel, which is formed between the surfaces of divided structures, originates in two distinct modes, generally assumes a firmer and more fibrous character in its advanced stages, and undergoes a more marked diminution of volume than is ob-

served in those adhesions which form on serous surfaces. From this it will be apparent that adhesions are formed by the medium, 1st, of a concrete inorganic albuminous matter; and 2d, of this matter, at a later period, in a more or less organised state, and presenting various appearances, according to the length of their duration, and the nature of the inflammatory disease which produced them. It will be also apparent, from the foregoing, that the adhesion of opposite surfaces is not in itself a specific disease, but the result of disease,—generally of inflammation in some one of its grades.

5. Adhesions, in respect of their ultimate tendencies, are either *reparative* or *morbid*. M. CRUVEILLIER, who has divided them in two classes, according to this view, comprises under the former the adhesions between divided tissues and surfaces brought about by surgical aid; to which I may add those that take place around purulent formations, and prevent the extension or effusion of the collected matter into adjoining parts. Whilst the reparative class of adhesions are stated to form generally between divided structures and diseased surfaces, it should be kept in recollection that all the tissues do not admit of adhesion taking place immediately between their divided surfaces. Blood-vessels, nerves, muscular fibres, and tendons do not unite after division. It is the minute vessels of the cellular tissue which surrounds them, and their individual fibres, which chiefly furnish the means of their adhesion. From these vessels, if protected from the atmospheric air, a coagulable lymph is thrown out; which gradually becomes vascular, organised, and in a few days cellular fibrous, and as firm as the parts which formed it. This newly produced substance is the medium by which the muscular fibres, or other structures which had been divided, are united; and this gradually becomes thinner and less apparent, and admits of the nearer approximation of the separated parts, until they at last seem continuous, although the existence of the medium of union may still be detected. This constitutes *primary* adhesion, the union by the “*first intention*” of surgeons.

6. When the division takes place between bones, this exudation forms the callus, into which ossific matter is deposited. Some pathologists believe that the concrescible lymph, thus furnished by the capillary vessels of the divided surfaces, particularly those of the cellular tissue, is the matrix, in which the peculiar structure, of which nerves or muscular fibres consist, is afterwards formed or deposited. But, if this were the case, the firm, and even fibrous, matter into which the medium of union is ultimately changed would at last disappear, and these structures be actually continuous. This, however, never unequivocally occurs; for, although the uniting medium is reduced to a very thin, and scarcely perceptible, substance, yet it may be made apparent by maceration and careful dissection.

7. When air is admitted between the divided structures, or when primary adhesion fails of taking place, a different process obtains; minute granulae or carunculae form upon their surfaces, whence proceeds at first a fluid pus, subsequently a more concrescible fluid, which forms a sort of false membrane, and which, when the opposite surfaces are kept in a state of near approximation, be-

comes the medium of adhesion, unless the state of the system is such as not to admit of the formation of this concrescible fluid, and of the other steps of this restorative process. When divided parts come in contact with the air, the adhesion is always formed in this manner,—by the suppurative process, whatever may be the nature of the structure which is thus circumstanced; and the false membrane, which is the medium of union, becomes more thin, firm, and fibrous, and, at the same time, less apparent with the lapse of time. This may be called *consecutive* adhesion. When the divided surfaces are protected from the air, and primary adhesion takes place, the process is more rapid; but its quickness will depend upon the quantity of blood effused between the divided surfaces. If this be considerable, one of two things will result,—either the effused blood will be absorbed, and a cyst, or cellulo-fibrous medium of union, be slowly formed, which will be gradually diminished in thickness; or the coagulum may act as a foreign substance, keep up irritation of the vessels in the divided surfaces, cause suppuration, and consecutive adhesion, with the cicatrix formed by the medium of union. (See art. *ABSCESS*.)

8. There is one important point connected with adhesions in their various states and seats,—whether *reparative* or *morbid*, whether *primarily* reparative or *consecutively* reparative, and whether taking place between cellular, serous, or other structures,—which has not received the attention from modern pathologists that its practical importance requires for it, and to which JOHN HUNTER first directed notice. I allude to the important truth, that adhesions of either of the above descriptions, but particularly the primary reparative, whether taking place between divided surfaces or around purulent formations, either will not form, or, if in the process of formation, will be dissolved, in certain states of the vital energies of the frame, and of the circulating fluid. Great depression of the vital influence will have this effect, whether it be produced by the exhaustion proceeding from profuse discharges, by contagious and other noxious miasms, by the close air of hospitals, and other places loaded with animal effluvia, by the inoculation of certain animal poisons, by the absorption of puriform or sanious secretions, or other morbid matters, into the current of the circulation, by the mercurial affection of the frame, or by the gouty diathesis. When the vital energies of the frame are greatly depressed, and the tonic action of the capillaries much relaxed, by causes acting either extrinsically or intrinsically as respects the blood-vessels, the ability of throwing out a concrescible or coagulable lymph from the divided or inflamed vessels is destroyed, and in its place is produced an ichorous serum, or sanious fluid, which may either pass out, or, if no ready outlet is afforded, will infiltrate itself, through the tissues adjoining, or be partially absorbed and vitiate the perhaps already morbid blood. (See art. *BLOOD*.)

9. In order to prevent this very dangerous state from supervening in all cases where the reparative process of adhesion is required, the utmost attention ought to be devoted to the state of the vital energies, particularly as indicated by the tone and frequency of the pulse, and the states of the digestive organs. When the former becomes

very quick, and the powers of the latter fail, that much dreaded state of the frame, which is insufficient for the formation of coagulable lymph, may be considered as approaching, if it be not actually present. In all cases where blood-vessels are liable to be inflamed, this state of the constitutional powers, owing to the risk of the blood being vitiated, is particularly to be guarded against. Having advanced as much as belongs to my province respecting the reparative states of adhesion, I proceed to state briefly the doctrine of *Morbid adhesions*. The particular morbid adhesions are noticed under the articles on the pathology of the parts in which they form.

10. Adhesions in some one of the states described above (§ 1—4.) are liable to occur, as a consequence of certain grades of inflammation, in the following situations:—1st, In the cellular tissue; 2d, between serous surfaces; 3d, between mucous surfaces; 4th, between synovial surfaces; 5th, in the internal surface of blood-vessels; and 6th, between the surfaces of morbid or accidental formations.

11. *A. Adhesions of cellular tissue.*—The first step of the process is the exhalation of a quantity of yellowish serum and of coagulable lymph into the cellules of this tissue, which ultimately agglutinates them together, upon the absorption of the former, and the concrescence of the latter. The consequence of this is, that the product of inflammation formed in the centre of the inflamed cellular tissue, consisting chiefly of the more fluid and least concrescible portion of the exhalation, is prevented from permeating the agglutinated cellules, and a barrier is set up against it. If resolution takes place and the purulent matter is absorbed, the surfaces of the cavity become united, and the medium of union is changed, as in cases of recent wounds, and in the manner described above (§ 5.). If the parts go on to the evacuation of the matter, adhesion is also effected, as in the cases of *consecutive restorative adhesion* (§ 7.); leaving, however, a cicatrix, which is gradually diminished, formed of the cellulo-fibrous medium of union. In all cases of inflammation of cellular tissues, adhesion of the cellules, from the exudation of a concrescible lymph, takes place; and it is this adhesion which forms the fibrous cysts to abscesses, isolates their contents from the surrounding structures, and in some respects excludes them from the economy. Adhesions of the cellules of this structure also strengthen the cysts of aneurisms, and form sero-fibrous cysts around foreign bodies that are accidentally lodged in it.

12. *B. Adhesions between serous surfaces* are the next most common; being formed through the medium, either of a more or less thick and firm inorganic albumen, in the form of a false membrane, or of this substance advanced to a more or less organised state, and assuming either the appearance of cellular tissue, with a surface partaking of the serous character, or one of the states about to be noticed. The organised nature of those adhesions has been denied by some; but the observations of STOLL, HUNTER, DUPUYTREN, BAILLIE, MECKEL, HOME, LOBSTEIN, CRUVILLIER, GENDRIN, BARON, and others, who have traced blood-vessels in them, have put the question at rest. Adhesions occur most frequently between the pleuræ, next in the peritoneum, and

next to these in the pericardium. They are comparatively rare in the tunica vaginalis; and in the arachnoid they are still more rare.

13. It is not necessary to the formation of adhesions between opposite serous surfaces, that the pre-existing inflammation shall extend continuously to both. When the coagulable lymph is thrown out upon one of the two inflamed surfaces,—as, for instance, of the peritoneal surface of the small intestines,—it seems to act as an irritant to the opposite part of the omentum, with which it is brought in contact, inducing inflammation of that part only, and leaving the intervening surface both above and below it unaffected. The part thus irritated by the contact of the coagulable lymph, poured out by the part primarily affected opposite to it, becomes also inflamed, and exudes this concrescible fluid; and the inflammation thus secondarily induced in a part of the omentum may advance to the external surface of the omental duplicature, and, by means of the exudation of this product of inflammation in that situation, excite a similar state of action in the directly opposite part of the peritoneum reflected over the abdominal parietes. Thus the inflammation and its consecutive adhesions may proceed, without the disease having affected any of the continuous surfaces intervening between them. A similar circumstance is sometimes observed in respect of the convex surface of the liver and peritoneal surface of the diaphragm. Inflammation, commencing in a part only of the former, will excite it in the part of the latter exactly opposite, and be followed by adhesion; and the inflammatory action, not infrequently extending upwards through the diaphragm to the diaphragmatic pleura, will be further followed by the exudation of coagulable lymph on its free surface, which, irritating that portion only of the pulmonary pleura opposite to, or in contact with it, will inflame that part, and form adhesions with it, without affecting the continuous surface intervening between, and surrounding the adherent parts. The unadhering cavity, however, not infrequently contains a turbid or flaky serum, with patches of false membrane, arising from a less acute state of inflammatory action in those parts of the serous surface immediately adjoining the adhesions. Thus it is not unusual to find, in cases of acute inflammation affecting either the peritoneum, pleura, or arachnoid, and limited to a particular part, a similar state of disease, and the same product, formed only in the parts opposite, and most nearly in contact; whilst the continuous surfaces surrounding them are either altogether sound, or much less affected;—most commonly only so far as to give rise to a serous exudation, or slight albuminous coating in their immediate vicinity.

14. From this it will appear, that the near approach, and more especially the immediate contact of opposite surfaces, and the want of motion between the one surface and the other, will favour the formation of adhesions: thus they are most frequent at the superior parts of the pleura, between the convex surface of the liver and the diaphragm, and the serous surfaces of parts included in Hernie. The different species of media, by which adhesions of serous surfaces are affected, are the following, according to M. CRUVILLIER:—an inorganised false membrane; a filamentous adhesion, and a cellular adhesion,

in neither of which blood-vessels are evident; a permanent organised membrane; and a tuberculated membrane. All these originate in a concrescible lymph, as in adhesions of cellular tissues. (See art. on SEROUS MEMBRANES.)

15. *C.* Adhesions between *mucous surfaces* are not frequent. BICHAT denied the possibility of their occurrence, unless destruction of the mucous membrane had taken place. He was led to this conclusion more by the functions of this membrane in health and disease, than by observation of facts. There can be no doubt, however, that the opposite surfaces of canals, covered as they are by mucous membranes, occasionally adhere, in consequence of very acute attacks of inflammation; but this occurs very rarely, owing to the access of atmospheric air, to the presence of gases, to the various matters constantly passing through them, and to the nature of the fluid which usually proceeds from inflammation of these surfaces. The most common exception which takes place to the general inference adopted by BICHAT is met with in the vagina. I have observed several cases, at the Infirmary for Children, where adhesions of the opposite surfaces of this canal had taken place in consequence of inflammation,—some of them at so early a stage, that they were removed by merely forcibly separating the adherent surfaces, when the mucous membrane was found perfectly entire, but highly inflamed, and covered by an exudation similar to that which is thrown out upon inflamed serous membranes. Similar facts are recorded by MM. DUPUYTREN, VILLERMÉ, BRESCHET, and CRUVEILLIER. Adhesion also of the *os uteri*, as a consequence of inflammation, is sometimes observed. Occlusion of the Fallopian tubes, and even the adhesion of the opposite internal surfaces of the uterus, have been occasionally met with. WALTHER, RYNAULDIN, and MECKEL observed these changes so often in prostitutes, that they attributed them to the frequent irritation of the parts, and imputed the barrenness of these females partly to this cause. But, in the cases of occlusion of the Fallopian tubes, more is to be imputed to the accumulation of an inspissated or albuminous mucus, the product of inflammation, which, from its tenacity and consistence, cannot flow along these tubes, than to actual organised adhesion of their opposite surfaces. The occasional occurrence of obliteration of the canals of the common bile-duct, and of the ureters from the impaction of a calculus, seems to proceed from the irritation and abrasion occasioned by calculi, and the consequent exudation of a concrescible fluid, which agglutinates their surfaces, and ultimately tends to reduce them to a cellulo-fibrous cord.

16. Adhesions are either never met with in the air passages, or so rarely, as to render their actual occurrence doubtful. I believe that, although albuminous concretions are occasionally formed in the bronchi, and frequently in the trachea and larynx, &c., they cannot be so produced as to give rise to adhesions of the opposite surfaces. They never, or at least very rarely, become organised; and, although they may completely obliterate the canals of several of the bronchi, they cannot have this effect on the trachea without causing immediate death. The organisation and form of the larger air-tubes completely prevent their adhesion; although they are often nearly

filled up with concrete albuminous formations, as a consequence of certain states of inflammation. Adhesions of the internal surface of the oesophagus, or of any other part of the digestive tube, are never met with; although constriction, with thickening, &c. to the almost entire obliteration of this canal, is not infrequent. As in the air passages, nature has made in the functions, during health and disease, of the membranes which line them, sufficient provision to prevent this lesion from occurring. And we uniformly observe, when inflammation attacks any portion of those tubes, the preservation of the canal of which is essential to life, that, although a copious albuminous exudation will sometimes occur, its organisation will generally be prevented, and its detachment from the surface on which it is formed will be secured, sooner or later, by the secretion of a more fluid, or mucous, or muco-purulent matter underneath, which loosens the concrete albuminous coating or false membrane from its attachment to the surface on which it is formed. The circumstances which chiefly seem to favour the formation of adhesions between mucous surfaces, are: 1st, The abrasion of the epidermis which covers them; owing to which their secretions are changed, and they partake more of the characters of cellular tissue. 2d, Entire destruction of the mucous membrane in a great part, or the whole, of the circumference of a canal, favouring its gradual constriction, suppuration, and ultimate obliteration. The bile-ducts, ureters, urethra, rectum, and oesophagus occasionally furnish proofs of this change in some one of its stages. (See art. on MUCOUS MEMBRANES.)

17. *D.* Adhesions of the *synovial surfaces* of joints are rarely observed, excepting in cases of anchyloses, of which they cannot be considered even as the commencement, although they may accompany the earlier stages of this change, particularly in anchyloses consequent upon rheumatism. Many, however, of the alterations which take place in the synovial apparatus of tendons are consequent upon their adhesion and obliteration. Inflammation occurring in them primarily, or extending to them from contiguous parts, is generally followed by their adhesion, and reduction to a state of dense cellular tissue. Hygroma almost always terminates by adhesion.

18. *E.* The adhesion of the internal surface of blood-vessels takes place through the medium of the coagulated lymph secreted by the inflamed vasa-vasorum. The vessel becomes impervious in consequence of this exudation, which is poured out in the form of a false membrane from its internal surface. The lymph which is exuded, particularly when its coagulable or concrescible property is well marked, frequently produces coagulation of the blood in contact with it; so that, generally, the obliteration is occasioned both by this lymph, and the coagulum of blood which it occasions. In a short time the coagulum thus formed within the inflamed blood-vessel becomes more and more pale and dense, sometimes partially organised; and, as its density is increased, so is its bulk diminished: the coats of the vessel, at the same time, lose their specific characters; they seem constricted around the substance formed within them, the middle coat becomes less distinctly fibrous, and at last they are reduced to the state of a cellular, or fibro-cellular, chord.

This may be viewed as the primary form of their adhesions, and its usual result. When, however, suppuration takes place in their internal surface, the adhesion is formed consecutively in the manner described above (§ 7.); or the primary may pass into the consecutive form of adhesion, particularly when the false membrane is insufficient to fill up the entire canal of the vessel.

19. Adhesions take place more readily in veins than arteries; are produced in both, and in lymphatics also, in the manner now stated, generally in consequence of inflammatory action, attended with sufficient power of the constitution to form concrescible lymph (see the articles on *ARTERIES* and on *VEINS*); and sometimes, even after a very slow and slight grade of this action, when the opposite surfaces of the vessels are pressed together by any tumour existing exteriorly to them. When artificially excited in arteries, as by the application of ligatures, the inflammatory state which produces the adhesion is not so prone to extend along the axis of the vessel, or to occasion dangerous effects, as when it is excited in the same way in veins. When thus produced in these latter vessels, fault of constitution, an unhealthy habit of body, unwholesome state of the atmosphere, &c., or the other causes above assigned (§ 8.), will generally interfere with the process, and occasion that state of morbid action, and of its products, which will vitiate the current of the circulation, and even destroy life. (See *VEINS* — *Inflammation* of.)

20. E. Adhesions of the internal surfaces of cysts, and other morbid formations, sometimes take place from a consecutive state of inflammation extending to them. Large cysts, which in consequence of their situation cannot be removed, may be obliterated by their puncture, and the production of inflammation of their internal surfaces, so as to procure their adhesion.

21. G. Adhesions may also form between parts of the cutaneous surface, when deprived of the cuticle, and kept in close contact. This is not infrequent after scalds and burns, and is produced in a similar manner, as I have explained, in respect of adhesions taking place primarily, and without suppuration, or subsequently to the occurrence of this process in the cellular and mucous tissues. Adhesions also occur in other situations, as between the iris and capsule of the crystalline lens, &c.; but I have noticed those which more especially belong to my province.

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ADIPOSE TISSUE. *Tela adiposa*, Lat. *Tissu graisseux*, Fr. *Das Fett*, Ger. — Its MORBID STATES.

CLASSIF. IV. CLASS, IV. ORDER (*Author, see the Preface*).

1. The adipose substance is frequently either diminished or increased far beyond the healthy standard. — A. Excessive diminution of this substance, *atrophy*, occurs naturally in very aged persons; and there seems to be, even in early life, a tendency to it hereditarily in certain constitutions, particularly in those of a peevish, anxious, and irritable temper. It is often met with as a consequence of, or conjointly with, pulmonary and other organic diseases, particularly those which interrupt assimilation and the supply of nutritions. But it is also a symptom of all diseases which impair the vital energies by morbidly increasing the secretions and evacuations: as in diabetes, diarrhœa, and dysentery. It also necessarily proceeds from long abstinence, &c.

2. Atrophy of this substance may be temporary or permanent. It is usually the former in early or middle life, and continues merely as long as the causes which occasioned it. It is usually permanent in advanced life, and in those of an active, peevish, restless disposition. In every case the removal of the fatty matter is produced by absorption; and, according to the experiments of *MAGENDIE*, *TIEDLMANN*, *GUYLÉN*, *MAYR*, &c., this process may be ascribed, at least in part, to the minute veins. The circumstance of fatty and oily matter being constantly found in the blood, but in variable quantity, as shown by *TRAIL*, *MARRINGTON*, *J. E. CANU*, &c., seems to support this view; for, if taken up by the absorbents, it may have been changed or assimilated in its passage through the absorbent glands before it could have reached the blood.

3. B. Excessive deposition or hypertrophy of this substance (*adiposis*) is very common, affecting the body generally, but sometimes locally only. Persons have weighed as much as 500 or 600 lbs. owing entirely to this state of hypertrophy. This tissue is naturally abundant in females and eunuchs. Its hypertrophy is frequently occasioned by excessive venereal indulgences, particularly in early life, and when conjoined with high living and indolence. It generally is attended by a weak languid circulation, weak digestion, with craving appetite, defective secretions and excretions, and disinclination to active mental or physical exertion. It also evinces a marked hereditary character. Full living, particularly on food which abounds with the elements of the fatty substance, as sugar, spirituous and malt liquors, &c. tend greatly to promote it. The connection of this morbid state with deficient assimilation appears fully proved. It would seem that in persons whose vital energies are diminished, whilst the appetite remains unimpaired, or is excited by stimulating liquors, &c., the sanguification of chyle does not take place so rapidly nor so perfectly as in health; that a large portion of this fluid assumes an oily or fatty character, and is deposited in the adipose tissue, which thus becomes one of the emunctories of the frame, in which a substance that cannot readily be carried out of the circulation by any other organ is set apart for the purpose of future absorption, assimilation, and nutrition, as the wants of the system may require, and to prevent its hurtful accumulation in the circulating fluid. Thus, in persons otherwise apparently healthy, the excessive accumulation of fat is often one of the earliest and most remark-

able signs of diminution of the vital energies of the frame. (See Art. OBESITY.)

4. *C.* In many instances, when the powers of the constitution are either greatly reduced or otherwise perverted from the healthy state, the adipose matter is also changed in colour, composition, and consistence, becoming remarkably pale, or dark, reddish, or gelatinous. It may likewise be, particularly in cachectic persons, uncommonly watery, soft, smeary, or jelly-like; and, on the contrary, but more rarely, hard, waxy, or even horny.

5. *D.* It may be a question whether or not this tissue is liable to inflammation. Considering it merely as a modification of the cellular structure, chiefly in as far as it contains the fatty substance of the body deposited in its areolæ, the containing tissue only must be looked upon as that which is liable to inflammation or any other disease; the fat or contained matter being entirely passive, and modified only by the morbid states of the tissue which secretes and contains it. There seems little doubt that the adipose tissue participates in the various states of diffuse inflammation; whether that attending upon certain forms of erysipelas, or following accidents, or the inoculation of morbid matter. When thus inflamed, it rapidly passes into a state of sloughy and fetid suppuration; large portions of it being not unfrequently converted into an ash-coloured, semifluid pulp, mixed with shreds of cellular tissue and albuminous matter, becoming entirely sphacelated.

6. *E.* Effusion of blood into the adipose tissue occurs under similar circumstances to those connected with hæmorrhage into the cellular substance, but much less frequently. This change has been occasionally noticed by HURKHAM, CLEGG, and CRAIGIE, by myself and others, in scorbutus, purpura hæmorrhagica, and in the luescent or malignant forms of remittent fever in warm or unhealthy climates.

7. *F.* Of the tumours most frequently developed in this tissue, the most remarkable are, — *a.* adipose sarcoma, which is surrounded by a thin capsule of cellular tissue condensed around it, and consists of an unusual accumulation of fatty matter in cells, the component fibres of which are so firm as to give consistence to the tumour: it closely resembles a local hypertrophy of the adipose tissue, excepting that it is surrounded by a capsule; and it may have either a broad or narrow base: *b.* steatomatous tumours are chiefly a peculiar modification of the fatty secretion, which is accumulated in masses, surrounded by a spheroidal cyst: they are not formed of cells, in which the fatty matter is deposited, but consist of a simple semifluid substance secreted by the inner surface of the cyst: they occur more frequently in the cellular, than in the adipose tissue: *c.* atheromatous and melicerous tumours are either modifications of the steatomatous, or proceed from the change induced in small chronic abscess; but they are most commonly the former when seated in this tissue.

8. *G.* Melanoid deposition is sometimes found in both the internal and external adipose substance. It may be either disseminated in the form of small inky spots, or accumulated in spheroidal masses; or found in a semifluid state and brownish-black colour, surrounded by a cyst formed by the condensation of the contiguous cellular tissue. As to the state in which this peculiar matter is formed,

great diversity of opinion exists. LAENNEC supposed that it is first secreted in a solid form, and, like tubercular deposits, afterwards becomes soft. I am, however, inclined to adopt the opposite opinion; viz. that it is secreted in a fluid or semifluid state, and that it afterwards becomes firm by the absorption of its more fluid parts. The observations of Drs. CULLEN and CARSEWELL, and of M. CHOMEL, seem to confirm this opinion.

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AFTER-PAINS. SYN. *Parodynia Secundaria Dolorosa*, Good.

CLASSIF. 5. Class, 3. Order (Good). II.

CLASS, III. ORDER (Author).

1. DEFIN. Pains, more or less severe, either continuing or supervening shortly after the expulsion of the placenta in child-birth.

2. SYMPTOMS AND DIAGNOSIS. Attacks of pain in the abdomen are usually experienced in the early part of the puerperal state. They proceed, when very severe, from the contraction of the uterus, irregularly excited by the presence of coagula. They usually soon follow delivery, are least severe after a first labour, are increased upon the application of the child to the breast, and last for a day or two. They are generally aggravated by flatulence and costiveness.

3. It is extremely requisite for the young practitioner to be on his guard respecting the nature and seat of pain after delivery, as the commencement of the most fatal diseases to which the sex are liable may be mistaken, if not carefully observed, for after-pains. These latter are the result of the natural contractions of the womb, and of its return to its former state; and are distinguished from disease, particularly inflammations of the uterus, ovaria, or pelvic peritoneum, by their remissions, and by the absence of tenderness or tension of the abdomen, especially on pressure. The uterine discharge also is not obstructed; the milk is secreted; there is no shivering nor vomiting; and the pulse is seldom increased in frequency.

4. When the patient's bowels have been neglected previously to confinement, and when much flatulence exists, the after-pains are often complicated with colic, or they assume a colicky character. In cases of this kind the abdomen is often somewhat more tense and distended than usual; the fits of pain are severe, with complete remissions; the patient complains of flatulence; the bowels are constipated: but the pulse is not much affected; the skin, particularly of the trunk, is not hot; the tongue is moist; and the feet are often cold; in a few cases there is retching. It is important to attend carefully to the character of pain consequent upon delivery, and to consider it in relation to the attendant symptoms, particularly the states of the pulse, and of the abdomen. We ought, therefore, to enquire into its exact seat, examine the pained part carefully with the hand; and, having ascertained in what manner it is affected by the examination, we readily arrive at just conclusions as to its nature. When it is felt in the regions of the uterus and ovaria, and accompanied by great fre-

quency of pulse, disorder of the lochial discharge, tenderness, and fullness of the hypogastric region, &c. the existence of the inflammatory diseases of the uterus, and of its appendages, are to be inferred. If it be complained of about the groin, it may be the forerunner of phlegmasia dolens; and if it be felt about the hip, or in the muscles of the pelvis, abdomen, or thighs, it may be rheumatic, owing to the application of cold in some form or other. The pains of rheumatism are readily recognised from their seat, their aching or gnawing character, the manner of their affecting the motions of the part, and the attendant symptoms. The diagnosis, however, of these diseases is fully pointed out under their respective heads.

5. TREATMENT. The exhibition of an anodyne, with attention to the state of the bowels subsequently, has generally been considered sufficient for the relief of after-pains. In the more severe cases, an anodyne liniment has been recommended to be applied to the abdomen, in addition to the exhibition of a dose of laudanum internally; and in protracted cases, Dr. Burns advises a purgative — certainly the best part of the treatment usually resorted to. I am, however, of opinion, from remarking the results of this practice, that the common or less urgent cases would have been better left to nature; and that friction of the abdomen merely with any of the liniments in the Appendix (F. 297, 298.), or friction followed by a purgative, or an enema, is all that is necessary. We ought to recollect that these pains are merely the result of the healthy tonic contractions of the uterus upon the congested veins, and the coagula remaining in it, occasioning their expulsion, and the discharge of the blood accumulated in its sinuses; and that the more effectually these ends are accomplished, particularly in unhealthy situations, and lying-in hospitals, the less risk will there be of the occurrence of dangerous forms of puerperal disease.

6. Whilst, however, anodynes allay the morbid sensibility of the uterus, they tend to diminish its tonic contraction, to induce a congested and relaxed state of its parietes and mouth, and to favour the admission of air into its cavity. Air, when admitted, particularly under certain circumstances, is productive of the most dangerous results, from its effects upon that portion of the surface of the womb to which the placenta was attached. Impressed with the justness of this view, I have usually recommended frictions with liniments over the region of the uterus, and a purgative, or purgative injection, which will tend essentially to favour the contraction of the uterus, and the expulsion of the cause of irritation.

7. In cases complicated with flatulency and colic (§ 4.), the above means are still more requisite; but much will depend upon the choice of purgatives. My own experience, derived entirely from consultation, is decidedly in favour of a draught, consisting of half an ounce of the oleum terebinthinæ, combined with the same quantity of oleum ricini; or an enema, containing the same medicines. The combination, also, of a purgative with assafoetida, or any other antispasmodic, and an injection, consisting of infusion of valerian, or containing assafoetida, with a due proportion of any aperient medicine (see F. 130, 135, 138.), will seldom fail of giving relief,

by removing flatus, and promoting the restoration of the uterus to its natural state. In the more urgent cases, anodynes may be conjoined to the foregoing means; for, when thus associated, they will not act in preventing the contractions of the uterus. (For HYSTERALGIA, and the various diseases of the uterus in the puerperal and unimpregnated states, see UTERUS.)

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AGE. SYN. *Ætas*, Lat. *Das Alter*, Ger. *Age*, Fr. *Êta*, Ital.

CLASSIF. — PATHOLOGY AND THERAPEUTICS.

1. In the succinct view I purpose to take of the pathological and therapeutical indications which this subject will naturally suggest to the mind of the practical physician, I purpose, first, to sketch the successive epochs of life, and thus consider the word in its generic acceptance. When I arrive at those periods of existence to which the word *age* is specifically applicable, the changes which take place in the human frame, in respect both of organisation and function, with the advanced progress of years, — with age in its specific acceptance, will be fully stated, as furnishing important data for practical indications in the treatment of diseases of this epoch.

2. OF AGE IN ITS GENERIC ACCEPTATION, — or different Epochs of Life. Before we proceed to consider the subject in its enlarged point of view, I may briefly advert to the periods into which the usual natural duration of human existence may be divided. Without occupying my limits with the divisions adopted by ancient and modern writers, I shall adopt that arrangement of the different epochs of life which has been suggested to my own mind, from observing the varying manifestations of life and function, and the modifications of diseased action with advancing age. The division which I have thus adopted may require more to be said in support and illustration of it, particularly in respect of its physiological relations, than I am willing to advance on a subject which may be considered as nearly verging on the speculative. Leaving, therefore, out of sight many of the physiological and psychological views, which would arise out of an extended investigation of the subject, I shall merely briefly advert to topics of practical importance; — those which concern the medical jurist fall not within the scope of this work. (For epoch of *fatal life*, see FÆRUS.)

3. Before proceeding to consider the different periods of age individually, it may be useful to exhibit a view of the arrangement I intend to follow: —

I. PERIOD, or that of Infancy.

1st Epoch, to the commencement of the first dentition.

2d Epoch, from the commencement, to the completion of the first dentition.

II. PERIOD, or that of Childhood.

Extending from the completion of the first to the completion of the second dentition.

III. PERIOD, or Boyhood — Girlhood.

From the seventh or eighth year to the commencement of puberty.

IV. PERIOD, or *Adolescence*.

Commencing with the first appearance of puberty, and extending to adult age.

V. PERIOD, *Adult Age*.

1st Epoch; or early adult age, or confirmed virility.

2d Epoch, or mature age.

VI. PERIOD, *Declining and Old Age*.

1st Epoch, declining age.

2d Epoch, green old age.

3d Epoch, advanced old age, ripe old age.

4th Epoch, decrepitude, Second Infancy.

4. I. PERIOD, or that of *INFANCY*, (*Infantia*, from the privation of speech,) commences with birth, and extends to about the end of the second year, when the first dentition is completed. It may be divided into two epochs; the first beginning at birth, and extending to the sixth or seventh month, when dentition is fully commenced; the second proceeding from this age to the end of the period, the completion of the first dentition, when the relations of the young being with the external world are fully established by the development of the sensorial and locomotive organs.

5. A. During the first epoch, or that preceding the commencement of dentition, all the structures are merely in the course of development; particularly the osseous system, the cerebro-spinal nervous system, and the organs of locomotion. The functions are only acquiring activity, and several of them have not yet appeared. The vital phenomena gain strength, whilst certain of those functions, by which the young being is to hold converse with the objects around him, either begin to dawn, or have not yet merged into existence. The manifestations of life are chiefly vegetative, and the movements automatic. The attitudes are generally without variety, and the changes of the countenance express merely pleasure and pain to the spectator; but, to the medical observer, they convey important information, and often all that he can obtain respecting the maladies incidental to this period of life. At this epoch, the position of the limbs, the character of their motions, the cry, and its numerous varieties; and especially the changes of the countenance; the state of the eyes and eye-lids; the openness, contraction, &c., of the eye-brows; the appearance of the lips and nostrils; of the mouth, gums, and tongue;—all furnish means of ascertaining the nature and progress of disease.

6. a. At this age the organs of digestion are unsuited to any other food than that derived from the breast of the mother; and so little capable are they to assimilate any other, even of the blandest and most digestible kind, or the milk of other animals, that very few, not more than one in six or seven, ever arrive at the more advanced periods of life who are deprived of the kind of nourishment nature intended for this epoch. At this age the system is extremely susceptible of external impressions acting upon the lungs, surface of the body, and digestive organs; and particularly to the influence of cold. Recently removed from a constant and unvaried warmth, and having heretofore existed with all the mucous surfaces shut from the action of foreign agents, the young infant imperatively requires to be preserved, particularly during the first months of

this epoch, from the influence of a low range of temperature, and from its sudden changes. The disposition to increased action in all the mucous membranes, and the great susceptibility of the respiratory nerves, require the surface of the body, and particularly the organs of respiration, to be guarded from atmospheric vicissitudes; the chief source of the diseases which are so prevalent and fatal at this age. A similar susceptibility of the digestive mucous surface also exists, and is but too frequently evinced by the slightest change in the milk of the mother, or addition of articles of food unsuited to the state of the digestive organs. Much of the mischief, however, which improper ingesta are calculated to produce, is guarded against by the copious secretion of mucus, with which the internal surface of the stomach and bowels is covered, particularly in very early life.

7. The susceptibility of the mucous tissues to stimuli and irritants, and their proneness to inflammatory action at this age, extend also to the cutaneous surface, as shown by the frequency of acute exanthematous diseases, and of chronic eruptions. The intimate sympathy existing between both these structures is very strikingly evinced, by the frequent association of inflammatory excitement of the mucous surfaces, particularly of the digestive canal, with a similar affection of the skin. The co-existence and close connection of inflammatory irritation of the digestive mucous surface, and an analogous state of disease of the brain and its membranes, or the supervention of the latter on the former, are also often observed. During the first months of existence, vascular action in the brain is prominently developed, and engaged in perfecting the organisation of this organ: and partly owing to this circumstance, as well as to the quantity of blood sent to it, compared with the rest of the body, and to the various causes tending at this age to derange its circulation, is readily kindled into an inflammatory state of its substance or membranes, giving rise to active congestions, effusions of fluid in the cavities and between the membranes, and to various other organic changes particularised in their appropriate articles.

8. b. With the susceptibility to be impressed by the causes of disease, evinced chiefly in the nervous centres and mucous surfaces, and producing their effects, not only on them but also on the serous cavities, there is intimately connected a marked disposition to be affected by medicines, which exert their influence in an especial manner upon the nervous system. Of these the most remarkable are narcotics and irritating stimulants. The susceptibility to the influence of the former, particularly the preparations of opium, and their effects, primarily in increasing vascular action in the brain, and secondarily in favouring congestion in the same organ, according to the dose, have appeared to me so important, that, during an extensive public practice amongst this class of subjects, I have scarcely ever ventured, during this epoch, on the exhibition of these medicines, excepting under peculiar circumstances, which will receive a more particular notice in other places. A similar caution is also necessary in the use of stimulating and irritating substances. The aperient medicines which are so often re-

quired at this age should be chiefly of a mild and unirritating quality; and, whilst cold and moisture must be avoided, too warm clothing, particularly of the head, ought to be equally shunned. Exposure to a mild, healthy air, frequent ablutions of the surface, with cold water during the latter part of this epoch, — commencing first with warm water, and passing on to the use of tepid, and afterwards of cold water, as the infant increases in strength, — followed by frictions, and careful attention to the state of its evacuations, are means which should not be omitted in the management of this period of life. Although cold bathing is generally beneficial after the first months of infancy have elapsed, care should be taken not to subject the infant to the influence of cold beyond a minute or two, or longer than may be requisite to the perfect ablation of the surface; for, at this epoch especially, the impression of cold continued for any considerable time depresses the vital energies, and prevents the development of that state of healthy secretion on the surface, which usually follows the momentary or brief action of cold, particularly when followed by dry frictions.

9. *B.* The second epoch of this period, extending from the commencement of the first dentition to its completion, embraces also the important period of weaning. The natural changes proceeding in the different structures and functions during the first epoch also continue through this. As this period advances, the functions of external relation, particularly speech and voluntary locomotion, commence; the phenomena of perception are more perfect, and the manifestations of mind begin to appear. The instinctive desires and emotions become more and more evident and active, and furnish, with the other functions, important indications of disease, and of the means of removing it. The susceptibility of the nervous system, and of the mucous surfaces, to be impressed by the usual exciting causes of disease, — particularly by cold, moisture, atmospheric constitutions, and vicissitudes, contagious or infectious miasms, and errors of diet and regimen, — is unimpaired.

10. *a. Teething*, which terminates the preceding epoch, and ushers in this, is commonly accompanied with more or less disorder of the system. In infants of a healthy constitution, and in whom the powers of life are energetic, disorder is scarcely perceptible unless from the operation of very efficient causes; but in those who are debilitated, whose conformation has been originally feeble, or imbued with any hereditary taint or morbid diathesis, or who have been weakened by unwholesome food and impure air, this process is often attended with great disturbance, in the frame, and, owing to the morbid sensibility and irritability it excites, frequently kindles up most dangerous disease. During the process of teething, particularly at its early stages, the itching and irritation of the gums are a constant source of excitement, or focus, whence irritation extends to the salivary apparatus, as proved by the increased flow of viscid saliva. The continued desire evinced by the little patient to allay the itching of the gums, by pressing between them whatever it can lay hold of, and the evident distress expressed by it if this sensation, which is known to be more insupportable than pain, can-

not be allayed, are indications which ought not to be overlooked. If this distressing sensation be not allayed by judicious means, the nervous system becomes inordinately excited, febrile commotion is induced, the functions of digestion are disordered; and we are, consequently, not infrequently called upon to remove inflammation of the membranes or substance of the brain, various convulsive affections, and inflammatory disorder of the digestive mucous surface, owing to the extension of irritation along the alimentary canal, as well as to the acidities formed in the stomach and bowels, from the imperfect digestion of the food. During dentition also, a marked disposition seems to exist in the pancreas to become excited, owing to its close sympathy with the salivary apparatus; and I am persuaded that several states of diarrhoea observed at this epoch originate in, or are perpetuated by, an increased secretion of pancreatic fluid.

11. Owing, moreover, to the excitement and irritation existing in the gums, affections of the respiratory and digestive mucous surfaces are more frequently associated with one another, and with increased vascular action in the nervous centres and their envelopes. It would seem that the irritation existing in the mouth disposes, from its influence on the nervous system, the mucous membranes not only to be invaded by the exciting causes of disease, but also to undergo a morbid action throughout. How frequently have the experienced practitioner observed inflammatory irritation of the digestive and of the respiratory mucous surfaces associated in the same case; and how often has he had cause to suspect the rapid supervention of irritation of the membranes of the brain, or of the brain itself, either with or without effusion, upon inflammation of the digestive mucous surface!

12. *b. Weaning.* — During this epoch weaning must take place. This should not be earlier than the eighth or ninth month, or later than the fifteenth; and the infant ought to have, at least, four teeth quite through the gums before it be commenced. The milk of the mother is the infant's only food during the greater part of the preceding epoch, or, at least, until the fourth or fifth month, unless the mother and child be in a weakly state. From this age upwards it requires food in addition to the nourishment afforded by the mother; but this must be given at first in small quantities, and not oftener than twice daily.

As the period of weaning approaches, food in larger proportion, and increased frequency, is necessary; and as soon as it shall have got teeth to masticate animal food, this may be given it in small quantity, and at first only twice in the week. Animal diet is seldom required before the completion of the first year, or previous to weaning; afterwards it may be given in gradually increased frequency, as the termination of the epoch approaches.

13. Whilst the infant is liable to most of the maladies which affect it during the first months, it is now also exposed to the invasion of many more; owing to the excitement occasioned by teething, the state of the milk, particularly during the last months of lactation, and the errors in respect of both the quantity and quality of the food. At the same time, however, its vital energies are more developed, and its functions more

perfect; and thus increased resistance is opposed to the extension of disease, and to its disorganising effects. All infectious and exanthematous disorders are very prevalent at this age; and, in addition to the maladies of the mucous surfaces already alluded to the lymphatic glands, particularly those of the abdomen and thorax, are frequently the seat of disease; and worms often begin to form, particularly after the period of lactation. At this age also, owing to the changes in the infant's food, as well as to the irritation occasioned by dentition, the disorders which originate in depraved or imperfect digestion and assimilation are especially prevalent, particularly aphthæ, rickets, tubercules, marasmus, and tabes mesenterica, remittent fever, scrofula, and numerous cutaneous eruptions.

14. *c.* The *therapeutical* indications at this epoch chiefly relate to the care which is required to preserve the head cool, and ward off the vascular excitement to which it is liable. Anodynes are less injurious at this period than in that preceding it, and are often required, particularly in soothing the irritability of the nervous system arising either from difficult dentition, from the exhaustion occasioned by previous treatment, or by disease, and particularly in the advanced stages of whooping-cough and croup. The state of the gums requires particular attention; and where there is evidence of itching, this sensation requires to be relieved, first, in the way that nature points out, by pressing hard and smooth substances between the gums, as a coral, ivory ring, and what is best, a gold ring, when this may be directed. If the least appearance of local affection, as tumefaction, redness, &c., or even merely constitutional disturbance, manifest themselves, the gums should be freely and deeply scarified. Aperients of a mild and cooling nature, are often required during this epoch; and in it, as well as in the preceding, blisters, even for a few hours only, particularly when the respiratory mucous surface is obstructed and its functions interrupted, or when the energies are exhausted and the vital resistance consequently reduced, must be employed with extreme caution, and give place to the use of those liniments which I shall have occasion to recommend as substitutes for them under such circumstances.

15. II. PERIOD, or that of CHILDHOOD (*Pueritia*), extends from about the second to the seventh or eighth year, when the second dentition is completed. During this period the development of the different textures and organs proceeds rapidly, and their functions are more and more perfect. The mental manifestations, particularly those which are intellectual, are developed, and the various moral emotions gain strength. The distinctions which exist between sexes throughout the whole physical and mental constitution at more advanced ages have not yet appeared. All the soft solids of the body evince increasing firmness, vital cohesion, and elasticity, and are protected by a firm covering of adipose matter below the integuments, and in the interstices between the muscles.

16. *a.* If the constitution be not vitiated by hereditary or acquired taint, defective nourishment, or previous ailment, or if the causes be not of a depressing nature, disease at this period assumes the sthenic character. Febrile diseases

are generally acute; and, unless proceeding from sources of infection, usually the result of local inflammatory action, which evinces a marked disposition to terminate in the formative process, or effusion of coagulable lymph, particularly when the serous surfaces are implicated. The susceptibility to infectious diseases, particularly those with exanthematous symptoms, is very great; as well as to inflammations of the different textures and organs—to pneumonia, bronchitis, cerebritis, meningitis, gastritis, enteritis, &c.: besides these, glandular obstructions, chorea, verminous diseases, epilepsy, and the various forms of angina, are very prevalent at this age, particularly in those whose digestive organs have been neglected, and when morbid matters have been allowed to accumulate in the *prima via*.

17. *b.* The *therapeutical* indications applicable to this age present few peculiarities, besides the necessity of resorting to active depletions, with a cooling regimen and alvine evacuations in the majority of its diseases; and the keeping in recollection the tendency of mucous sordes and secretions to form and accumulate on the digestive mucous surface. Such accumulations furnish a nidus for the generation of worms, and sources of irritation to this surface itself, and to the nerves proceeding from it; and originate many of the affections which appear at this, and a subsequent period of existence. The necessity of enjoying, and the injurious consequences of the privation, of wholesome nourishment and active exercise in a pure atmosphere, and the advantages of sleeping alone in a large well-ventilated apartment, should not be overlooked, in their relation both to the production and to the removal of disorder. The employment of the faculties of the mind during this early stage of their development should be left, until the last year or two of this period, more as a matter of amusement than of exertion; and, even then, greater attention should be paid to the development of the physical powers,—the organisation upon which sound mental manifestations very intimately depend,—than to the precocious and even hurtful excitement of faculties which are merely budding into existence. The emotions of mind, however, particularly those which are connected with temper and disposition, ought first to receive attention; strict control cannot be prematurely applied in this direction. In this and the preceding epochs of life, it is indispensably requisite not to allow the child to sleep with persons in bad health, or who are far advanced in age.

18. III. PERIOD, or BOYHOOD — GIRLHOOD. From the seventh or eighth year to the epoch of commencing puberty, is chiefly characterised by the continued growth of all the structures, and the development of the manifestations of mind. Towards the middle and end of this period the physical and mental distinctions of sex become more and more apparent. *a.* The frame, when free from disease or hereditary taint, evinces a sthenic diathesis, a predominance of the sanguine, or sanguineo-nervous temperament, and a liability to nearly the same diseases, particularly those proceeding from infection and inflammation, that prevail during childhood. There is a greater liability to be affected with idiopathic continued fever, with scrofulous enlargements and inflam-

mations, particularly of the lymphatic glands; with various nervous affections, as epilepsy, convulsions, chorea, &c.; with cutaneous eruptions; with inflammations of the throat and air-passages; with tubercles, especially in the lungs and alimentary canal; with flexures of the spinal column, and with verminous diseases. The nervous system possesses great susceptibility of impressions, moral and physical; and inflammatory action has a marked disposition to give rise to new formations, unless when appearing in the advanced stages, or as a sequela, of eruptive or infectious fevers, when it generally occasions serous or sero-albuminous effusions.

19. *b.* The diseases of this period generally require antiphlogistic remedies and evacuations, especially purgatives, either alone or in suitable combination, unless proceeding from depressing causes, particularly those of a specific kind; and even there the necessity of resorting to alvine evacuations, by means of laxatives, or purgatives combined with tonics, is imperative. The vital resistance is usually well marked, excepting in those who have been deprived of wholesome nourishment and pure air, or whose constitutions are radically in fault; and in these, whilst tonics and other means of restoration are required, the due evacuation of morbid secretions and accumulations is equally necessary. Care also should be taken during this, as well as in the preceding period, not to allow the young to sleep in the same bed with the old, nor even with those advanced in age or debilitated, nor with too many—not more than three—in the same sleeping apartment, which ought to be large and well aired. Want of attention to this, is one of the chief causes of disease in early life in London, and other large towns. Academies and boarding schools for both sexes are continually furnishing numerous proofs of this too generally overlooked cause of disease, not only at this, but also at a later stage of life. Attention is also necessary to the exercises of both the mind and the body. Active amusements in the open air are now particularly required. As this period advances, the mental powers acquire such a degree of development as to admit of their further improvement and active exertion,—not only without risk to the organisation with which they are related, but with the certain prospect of advancing them nearer to the perfection to which our natures may attain.

20. During this and the earlier terms of life frequent changes of locality and of air, particularly from one ~~place~~ ^{place} and open situation to another, and especially to one which is more salubrious, where this can be attained, are extremely beneficial, both in promoting the development of the frame and in removing diseases, particularly those of a chronic kind, or which affect the digestive and assimilating organs. In many of these diseases I have often derived more advantage from change of air than from the use of medicine. But, during advanced convalescence from these and febrile diseases, the benefit derived from change of locality is most remarkable.

21. IV. PERIOD, OR ADOLESCENCE, commences with the first appearance of puberty, and extends to the twentieth year of females, and the twenty-fourth of males. Puberty appears at various

ages, according to the climate, the circumstances connected with education, and the constitution of the individual. The usual period in this country, is from the twelfth to the fourteenth year for females; and from the fourteenth to the sixteenth for males. In the northern parts of the island, it is often a year or two later in both sexes. It is often observed earlier in boarding-schools, both in respect of males and females. In the latter (in London or its vicinity), I have not infrequently met with instances of menstruation at ten and eleven years; especially in sanguine and plethoric constitutions; and where the apartments, particularly those for sleeping, have been crowded and close.

22. *a.* This is one of the most important epochs of human existence: for during it the natural development of the sexual organs imparts a healthy and tonic excitement throughout the economy; bringing to their state of full perfection all the organs of the body and all the manifestations of mind, excepting those that are derived from experience. The organs of respiration and voice have acquired their full growth and tone, the muscles their due proportion, and the cerebro-spinal nervous system its beautiful organisation; placing man, by the exercise of its admirable functions, at the head of all animated creation,—the dread of all other animals, the wonder of himself. It is chiefly during this period of life that the mind becomes supplied with ideas, derived both from the learning of the ancients, the science of the moderns, and the arts and accomplishments of highly civilised life; and is more particularly and more ardently engaged in decomposing the information thus acquired, and recombining it in new and useful and attractive forms.

23. As the functions and destinies of this period are important, so they require the supervision of the experienced and the good. For, with this development and activity of both the physical and mental powers, the instinctive feelings and emotions of our nature have also reached the utmost limits of their activity; and many of them, particularly those which are related to the perfect condition of the reproductive organs, acquire an ascendancy, that both the dictates of reason and moral restraint are required to control. Hence the propriety, both at this and the preceding period of life, of improving the moral affections of the mind; of inculcating sound principles of action and conduct, founded on moral and religious obligations; and of placing them in such relations to the feelings, the intellectual manifestations, and, moreover, to the accomplishments, the elegancies, and the endearments of life, as to render them attractive to a state of mind and constitution which is more easily allured by example than taught by precept.

24. The practices which both sexes are liable to acquire at this period of life, and to which they are more commonly addicted when they associate in numbers at seminaries and academies, demand the strictest supervision. They have been too generally overlooked, both morally and medically, from the circumstance of their consequences having been imperfectly appreciated. There is no practitioner of observation and experience,—certainly none of even limited knowledge,—who has travelled into foreign countries, and is yet

unacquainted with the physical exhaustion, the mental torpor, and all but annihilation of existence, which is the ultimate result of indulging them. From this source frequently spring, impotency hereafter; the extinction of families and hereditary honours—honours which such persons are incapable of achieving; the infliction, during after-life, of many of the diseases which proceed from debility, and the exhaustion of the nourishment and vital energy of the various structures and organs; of numerous nervous and convulsive maladies, as hysteria, epilepsy, neuralgia, chorea, melancholia, mania, idiocy, &c.; the dangerous or fatal visitation of fevers; diseases of the heart, disorders of the digestive organs, premature baldness and old age, the formation of tubercles, and the production of pulmonary consumption; and, lastly, the transmission of weak and decrepid bodies and minds to the offspring; of scrofula, rickets, verminous complaints, marasmus, hydrocephalus, convulsions, tubercles, chorea, &c.: the curse is visited on the children to the third and fourth generation, until the perpetuated punishment extinguishes the very name of the aggressor.

25. *b.* The pathological conditions of this age are especially characterised by exalted action. At the approach and commencement of puberty, the glandular system is extremely prone to catarrhative inflammations, particularly the lymphatic glands of the neck and arm-pits. Tubercles are rapidly developed in the lungs; and this organ is much disposed to acute and chronic inflammations of both their substance and mucous surfaces. Pulmonary hæmorrhages usurp the place of the epistaxis of earlier epochs; and, in females, dysmenorrhæa, protracted or retained menstruation, chlorosis, hysteria, and occasionally menorrhagia or leucorrhœa, occur. The sanguine diathesis and plethoric habit, in those of a sound constitution, and the sanguine, irritable, and nervous temperaments, or the one associated with the other, most commonly prevail at this period of life.

26. The progress of disease is generally rapid, and its character acute. Inflammations are more prone to give rise to the formative processes; and febrile affections, when they terminate by crises, evince a preference to hæmorrhages and sweats. Idiopathic fevers, inflammations of the respiratory organs, and of the brain or its membranes, are the most common diseases of this age.

27. *c.* The therapeutical indications require but little remark; for the system has now nearly, or altogether, reached its full growth; and the general inferences which guide the practitioner in the employment of remedial means have now reference, especially, to states of habit, constitutional powers, temperament, and diathesis,—physical manifestations, which are now, in a great measure, developed, but which acquire their most predominant characters in adult age. As the maladies of this period are generally inflammatory, and evince a strong tendency to the formative process, and as the powers of life are now most energetic, vascular depletions, with the antiphlogistic regimen, are generally required, and are well borne; excepting in those whose constitutions have been originally in fault, or who have greatly injured it by the injurious practice of masturbation, from which so many

suffer, both at this and subsequent epochs of life.

28. V. PERIOD. ADULT AGE may be divided into the epochs, 1st, of *early adult age*; and 2d, of *mature age*, or *confirmed virility*. Of each of these I shall take a brief notice.

A. Early adult age may be dated from twenty to thirty in the female, and from twenty-four to thirty-five in the male. During this epoch, if the constitutional powers have not been injured previously, the whole frame and its individual organs continue to acquire strength; and, although the body has ceased to grow in height, it increases in bulk, particularly the muscles of voluntary motion and the parietes of the large cavities. It is also more capable of enduring continued exertion and privations; its vital endurance and resistance being greater than during the period of adolescence. The features and expression of the face; the character, disposition, temperament, and diathesis, are more unfolded, and towards the termination of this period fully display their manifestations.

29. *B. Mature age*, or *confirmed virility*, may be considered as being from thirty to forty, or forty-two, in the female, and from thirty-four to forty-eight in the male. During this time of life, the features of the countenance fully assume those modifications of character arising from the influence of the passions and emotions of the mind; and the appetites, habits, and occupations of life imprint upon the frame generally certain appearances, arising from their continued influence on the constitution. The muscular organs, particularly the muscles of the extremities, are prominently marked; the chest fully developed; the body spare and active; the adipose structure extremely scanty, and the abdomen small, in those habitually devoted to laborious employments, not of a sedentary nature, and to active exercise, either on foot or horseback. The sedentary, those addicted to the indulgence of the appetites, and particularly those given to the gratifications of the table, have large abdomens, small extremities, and large depositions of adipose matter beneath the integuments, between the muscles in the omentum and surrounding the viscera, with a weak and defective development of the muscular parts. The studious present the chief marks of their occupations on the features of the countenance and character of the head; the appearance of the rest of the frame varying with the habits and indulgences with which study or the prosecution of science may be conjoined. At this period of life also the feelings, the anxieties, the disappointments, the losses, and the various moral emotions of life, begin to manifest those effects upon the frame, which become still more fully marked during the following epoch.

30. This and the preceding period of adult age are, upon the whole, the most exempt of all others from disease; but about the age of forty, and still more so as the age of fifty is approached, the sanguineous circulation becomes more and more languid, particularly in the veins: hence the frequency of venous congestions and visceral obstructions, with the various diseases depending thereupon, particularly hæmorrhoids; bilious derangements; bilious and gastric fevers; inflammations; affections of the heart; apoplexy and paralysis; derangements of the stomach and liver;

hamatemesis; affections of the joints, as gout and rheumatism; diseases of the urinary organs; hysteria and uterine disorders; hypochondriasis, and affections of the mind. At this period therapeutical means require to be strictly regulated according to the sex, constitution, temperament, habits, and occupations of the affected.

31. VI. PERIOD. AGE, IN ITS SPECIFIC ACCEPTATION, may be divided into four epochs: viz. 1st, *Declining age*; 2d, *Green old age*; 3d, *Advanced old age*; 4th, *Decrepitude*, or second infancy. Before I proceed to consider these individually, I will take a view of the changes which supervene with age in the structures and functions of the body.

AGE, in the specific acceptation of the word, may be considered as commencing when the vital energies of the different organs begin to decline, — when the maturity of life glides into decay. The period at which this change supervenes varies very much in different persons, according to their constitutions, employments, and habits during the earlier epochs of existence. In many it is so gradual as to be imperceptible; in others it is more obvious; and in some it is induced rapidly and remarkably, by mental anxieties and bodily disease. The usual period of its advent, in both sexes, and the different epochs in which age may be divided, will be stated in the sequel.

32. As age steals on, all the functions are performed more languidly than in earlier life. The energies of the ganglial system decline, as evinced by the digestive, circulating, and secretory functions, which it actuates. The sensibility of the cerebro-spinal system, and of its dependent organs; the acuteness of our intellectual powers, our moral emotions and affections, and the activity and strength of the locomotive organs, — all experience diminution, great in proportion to the advances of age.

In noticing the pathological and therapeutical relations of age, those changes of structure and of function which supervene with it will first receive attention; next, the different terms into which it may be divided, with those modifications which diseased actions generally assume in each term respectively, and those indications which should guide our practice in the diseases to which each is most obnoxious, will be briefly considered.

33. A. The modifications of structure produced by age are occasionally slight; but most commonly they are very remarkable, particularly in certain organs. In some parts they are scarcely perceptible, in others more obvious, consisting chiefly of increase of density; and in many they amount to actual change of texture.

The integuments, particularly those of the face, and the hair, are amongst the earliest parts to exhibit the advance of age; and they most obviously indicate the different stages of its progress. The integuments of the face seem more developed than in early or mature age. They are denser and thicker, especially the cutis vera and rete mucosum; which latter assumes also a somewhat darker tint. The skin appears more loosely attached to the parts underneath it, chiefly owing to the diminution of the subjacent fat, and shrinking of the other soft solids. Hence it appears, particularly in the face, neck, and hands, flaccid and wrinkled.

34. The hairs of the head are, perhaps, the first

to evince the commencement of age; and they present the most common indications of the progress of decay, either by a more or less complete change of colour, or a partial and general loss of them. The change of colour at first consists of a few white or grey hairs, scattered amongst those of a natural hue; but these gradually become more numerous, particularly on the temples, until the whole hair is altogether grey, and ultimately white and transparent. As this change proceeds, the hair also falls out, especially on the crown and forehead. There are, however, many circumstances which accelerate these phenomena, independently of age. Thus fevers, severe courses of mercury, masturbation, &c. will occasion the loss of the hair. But when it falls out from disease, the bulbous roots not being obliterated, its reproduction generally follows; whereas, when it is lost from old age or from masturbation, it is never reproduced. There are also various causes which occasion a change of its colour, particularly the depressing passions, intense application to study, anxieties of mind, venereal indulgences, &c., and which at the same time accelerate the loss of it. The change of colour, and subsequent loss of hair, seem to arise from deficient nutrition, and consequent atrophy, or destruction of the bulb, together with some change in the skin itself. In some cases it seems to arise from chronic disease of the rete mucosum and cuticle, as stated in the pathology of certain cutaneous affections.

35. The adipose and cellular tissues experience considerable change. The fatty deposit diminishes with the progress of age, and it sometimes becomes more fluid and watery, as well as of a deeper tint. The cellular tissue is somewhat denser, more fragile, and less elastic than in early life. In some situations it assumes a fibrous character, particularly that portion of it which invests the muscular fibres. The serous membranes are also more dense, more subject to ossific deposits, and their free surface drier than in early life. The mucous surfaces exhibit but little change, excepting as respects their greater paleness, and tendency to certain states of disease. The fibrous structures become more rigid, and in various parts the seat of ossific deposits. They also assume a deeper colour, and a firmer and tougher consistence, whilst their physical cohesion is much increased as age advances.

36. The muscles of voluntary motion experience a very marked change, particularly at the advanced epochs of age. They are much diminished in bulk. Their fibres are more rigid, less readily influenced by stimuli, and less contractile than in early life. They are also less under the control of volition, much less energetic in their actions, more flaccid, and endowed with less vital tenacity. Their structure is also somewhat modified. They are paler, sometimes of a light yellow colour, and their fibres less distinct than in youth. The tendons and aponeurotic expansions of muscles, as well as the cellular tissue intervening, are often partially ossified. Portions of muscles, near their tendons, are sometimes converted into a tendinous structure; and the secretions poured into the sheaths of the tendons are remarkably diminished. From all these changes result the vacillating, embarrassed, and weak movements of the aged.

37. The *bones* acquire a dense structure, and, even a somewhat increased size, particularly the bones of the head, the sutures of which become firmly united, first in the internal, and afterwards in the external surface. The *cartilages* are ossified, particularly those of the ribs. The *intervertebral cartilages* become hard, inelastic, and shrunk: hence the impaired flexibility of the spinal column, the bending forwards of the trunk, and diminished stature of aged persons.

38. The *blood-vessels* undergo very remarkable changes. The *arteries* are gradually diminished, in proportion to the bulk of the body, as age proceeds; and the predominance of the venous over the arterial system is more and more apparent. Whilst the arterial vessels become, on the one hand, more dense and rigid in their coats, their calibre diminished, their smaller ramifications altogether obliterated, and their *vasa vasorum* indistinct, the veins seem, on the other hand, somewhat thinner in their coats, more dilatable, and their calibre increased; they are also more tortuous, and hence their capacity is augmented: so that, although the quantity of blood contained in the body is diminished, particularly at the most advanced stages of life, about two thirds of it are contained in the veins. Besides those changes of capacity, the coats of the vessels present changes of structure. The *arteries* are liable to ossific and other deposits, rupture of their coats, &c.; the veins to varix, inflammation, &c.

39. The *brain and nerves* are also somewhat modified by age. The membranes of the former are generally slightly thickened and opaque. The bulk of the brain is diminished, and its substance firmer, and tougher than natural, and less readily acted upon by chemical reagents. The nerves seem to possess a diminished quantity of medullary substance, and their blood-vessels are indistinct. The *ganglia* become firmer, of a deeper colour, and smaller than in early life.

40. The *organs of sense* undergo important alterations. The eyes are changed chiefly by the diminished secretion of aqueous fluid into the anterior chamber, occasioning less prominence of the cornea, and a change of its refractive power. The crystalline lens acquires a yellowish tint, and is less transparent. The nerves of the eye, particularly the optic nerves and ophthalmic branch of the fifth pair, and the iris, are less sensitive than before; and hence the dilatation of the pupil, the distant sight, and the confused appearance of near objects to aged persons. The ear experiences a change similar to that which takes place in the eye. The fluid occupying its internal cavities is diminished or altogether absorbed; and the auditory nerve rendered insensible to impressions, from this and other changes in the conditions necessary to its functions. The other organs of sense, particularly taste and smell, have also their sensibility similarly blunted.

41. But changes are not limited to the more elementary structures of the body; and organs of sense, the *viscera* of digestion, secretion, assimilation, sanguification, and generation undergo anatomical alterations. The teeth loosen or decay; the gums are partially absorbed; and the jaws, deprived of teeth and of their alveolæ, approximate more closely. Hence the projection of the chin, its approach to the nose, and diminished capacity

of the mouth. To these causes are partly to be imputed the change which takes place in the speech of the aged. The *stomach and bowels* are generally flaccid, owing to deficient contractility of their muscular coats; but the *liver, pancreas, and spleen* present but little change, excepting they are, or have been, the seat of disease, unless slight atrophy, or enlargement and increased density. The *urinary organs* are more frequently altered: calculi are not infrequently met with in the tubuli uriniferi and pelvis of the kidneys; and the urinary bladder is generally thicker and firmer in its coats than in early life; the prostate gland is commonly somewhat enlarged.

42. The *lungs* are not necessarily changed by age, further than that they become less elastic, their air-cells enlarged, some of the bronchial ramifications more dilated, and portions of them emphysematous. They frequently, however, present the remains of antecedent disease. The *heart* partakes, although in a less remarkable manner, of the changes experienced by muscular parts. The tone and energy of its fibres are lowered; its structure is softer, more flaccid, and occasionally also paler. It is sometimes diminished in size; or some of its cavities are dilated, and their parietes thinned; and cartilaginous or ossific formations, or both, occur in parts of its internal surface, particularly in the valves.

43. The *organs of generation* experience a marked alteration. The *ovaria* shrink, become dense, and their vesicular structure changed. The *uterus* is diminished in bulk, unless it is the seat of organic disease, to which it is very liable, particularly at its mouth and neck. The *mammæ* also waste, are soft, pendulous, and lastly are entirely absorbed. The *areolæ* become dark, and the nipples shrink. At the commencement of age they are subject to congestions, indurations, and scirrhous disease. The *testes* shrink, or become soft and small, or even nearly disappear. The *penis* is shrunk, seldom experiences the vital turgescence, and lastly not at all; the faculty of generation having previously disappeared.

44. In this rapid sketch of the chief changes which the structures and organs of the body undergo from age, there are several phenomena which must strike the reader. The chief of these are, the gradually increased density of the different textures, and the consequent diminution of their watery or fluid constituents, as well as of the blood itself. In childhood and early life the textures are succulent, and the circulating fluid abundant. But as age advances, they acquire an increase of their physical cohesion, whilst their vital attraction is diminished. This increase of density and diminution of the fluid elements of the structures, with the progress of age, are constantly observed in the vegetable kingdom of nature: and, as we advance upwards, through the various grades and classes of animals, we find this principle strictly adhered to. In addition to this, another phenomenon is remarkable; namely, the redundancy of osseous matter, as evinced not only by the increased quantity of earthy matter in the bones and cartilages, but also by the deposition of this substance in the coats of the arteries and in other textures. Somewhat analogous to these formations, and sometimes even vicarious of them, is the abundance of sabulous deposits from the urine, frequently observed to occur either during

the secretion and retention of this fluid, or after its discharge.

45. Not only are the mechanical conditions of the different parts of the body modified by age, as now stated, but their chemical properties are also similarly affected. The gelatin disappears, or becomes changed to albumen; the fibrin is increased, and assumes a deeper hue, and is less easily affected by maceration or exposure to the air. The phosphate of lime is augmented, and often accumulates to a very hurtful extent, together with the other earthy salts and urea.

46. *B. Of the conditions of function characterising the advance of age.* a. Although the changes, which have been now described as supervening in the different structures with age, may have originated in those imperceptible and slow modifications which the various organic functions experience from peculiarities of constitution, of food and employment, or from acquired habits and indulgences; yet there can be no doubt that, when once induced, they modify still further these functions, and thus draw on other lesions, and ultimately still greater alterations of both function and structure, or even speedily fatal disease. But we are not altogether justified in considering these contingencies as the primary causes of the changes now described. We are rather to view them as more or less remote effects of the failure of the vital endowment of the frame, manifesting itself first in a less perfect performance of the different functions, and subsequently in modifications of structure, and ultimately in very obvious lesions of both function and structure.

47. *b.* It is supposed by some, that the embryo at its earliest formation is endowed with a certain sum or allotment of vitality, which, in the earlier epochs of life, is engaged in the formation of, and in bringing to perfection, the different structures and organs of the frame; that it is gradually exhausting itself ever after, until it at last expires; and that the greater the excitement of its different manifestations and functions during the subsequent stages of existence, the more rapidly will its termination be reached; that the oil with which the lamp of human, and indeed all animal, existence burns is filled at its commencement, and is never afterwards supplied; and that the more brilliant the flame, the shorter will be its duration. This captivating hypothesis, however, appears, on an intimate view, irreconcilable with many of the phenomena of health and disease. It cannot readily be conceded that the allotment of vitality bestowed upon the germ or germs can exceed that possessed by the parents, — for the hypothesis is, that the sum of vitality is greater the younger the animal; and that it diminishes with the advance of days and years, from the period of its endowing the embryo. But it is obvious, that the greater vital endowment cannot issue from the smaller; that the parents cannot possibly impart to the embryo more than they possess, they still retaining a portion afterwards: more particularly when we consider that the greater endowment is imparted not to one embryo only, but to several, as is the case in the lower animals, and often in the human species also.

48. The phenomena, moreover, of disease furnish us with proofs that this sum of vital endowment is neither thus early and at once bestowed, nor thus

uniformly diminished, according to the waste it experiences, without occasional reinforcement. We frequently perceive all the manifestations of life reduced, at different epochs of existence, nearly to total extinction, particularly in several kinds of fever, when, having received the requisite aid from external stimuli, they have been gradually restored to their former activity. Indeed, the various circumstances in which the body is placed, and the different states it presents at different periods of life, and from numerous causes which affect it, seem rather to favour the idea that the sum of vitality, and its manifestations in the different organs, fluctuate more or less during the allotted period of existence; that a certain emanation of vitality proceeds from the parents, great in proportion to their constitutional powers; but that this endowment is constantly experiencing an accession, first from the mother, and subsequently from the common sources of air and aliment; that this reinforcement is thus constantly supplying the waste arising from the exercise of the various functions, and adding to the bulk of the structures, until manhood is reached; and that at this period the sum of vitality has reached its greatest amount, from which it gradually declines, owing rather to the waste, particularly that occasioned by the exercise of the generative functions, exceeding the supply, than from the continued expenditure of what is at first bestowed and never afterwards reinforced.

49. Having been induced by the foregoing, and other considerations, to relinquish the former for the latter hypothesis, I infer that the gradual diminution of the vital energies that accompanies the progress of age is more or less manifested throughout all the functions; that the functions first evince this decline, and that the organs themselves are at last modified in organisation, from the slightest and almost inappreciable shades to the most marked alterations. The changes of structure, once induced, tend most essentially to heighten and to perpetuate the previously slight disorders of function, until both the one and the other undergo, by reciprocity of influence, most important alterations, terminating at last in death, and the dissolution of the frame. I now proceed briefly to notice those changes of function, which, frequently related to the alterations of structure described above, mark the existence of Age.

50. *c.* I have, in another place, stated that, of all the different tissues of the frame, the ganglial system is the most intimately related, in every way, to the vital influence which endows the body. And it is precisely those organs which are most immediately connected with this system that first furnish proofs of incipient decline in the languor or imperfections of their functions. Amongst those functions are comprised those of digestion, secretion, circulation, assimilation, the preservation of the animal temperature, and generation. The functions of animal relation are not so soon affected; and at first the change in them is rather secondary, and owing to the pre-existing change of the functions of organic life, — of those functions which are excited or actuated through the medium of the ganglial system.

51. As very intimately dependent upon the state of the ganglial system, the secretions manifest, with the advance of age, the most remarkable

lesion. These are generally modified in *quantity*, in *fluidity*, and in *quality*. 1st, The quantity of the secretions, both recremental and excremental, is sensibly lessened. The salivary, gallic, biliary, cutaneous, and spermatic secretions evince this change. 2d, Their fluidity is diminished, as shown by the salivary, the lachrymal, cutaneous, and watery exhalations and secretions. And, 3d, their properties are modified, as proved by their marked tendency to assume, immediately as they are secreted, irritating and acrimonious qualities, as shown by their effects upon the tissues, with which they remain for any time in contact, and to pass rapidly into decomposition. The urine, and occasionally the lachrymal, the mucous, the biliary, cutaneous, and sebaceous secretions evince this change. It very generally happens that the secreted fluids experience more than one of the above alterations; they being diminished both in quantity and in fluidity, and at the same time deteriorated in quality. This is remarkably the case in respect of the cutaneous, mucous, and urinary secretions; the chief exception being furnished by the mucous fluid, which is sometimes increased, although it is of diminished fluidity and altered quality: but this is rather an effect of disease, than merely of advanced age.

52. Next to the function of secretion, and owing to the same cause, — the diminution of vital influence, — that of circulation is most sensibly affected. The action of the heart is slower than in early life, much less energetic, and occasionally irregular. The capillary circulation is more languid, and a much smaller quantity of blood penetrates the extreme ramifications and nutritious vessels, in consequence, most probably, of the diminished calibre of those vessels, and the increased density of the tissues in which they terminate. The venous circulation is more congested, and more prone to experience the consequences of engorgements, particularly varicose dilatations, giving rise to effusions of blood and other serious diseases. The blood itself is not only diminished in quantity, but is also of a darker colour, and is probably also slightly changed in quality, particularly in respect of certain of its saline constituents. The absorbent system is less frequently disturbed in its functions by age than almost any other part of the frame, although it occasionally evinces diminished power, but chiefly in connection with disease. To the predominance of the absorbent function over that of arterial circulation has been partly ascribed, and with apparent justice, the wasting and condensation of the structures characterising the most advanced epochs of life.

53. As intimately connected with the weakened energy of the ganglionic and vascular systems, the functions of digestion and assimilation are languidly performed. The gastric, pancreatic, and biliary juices are less abundantly secreted in the aged than in those of early or mature years; and the tonic contractility of the coats of the stomach and bowels is diminished. Hence result various dyspeptic ailments, flatulence, and a sluggish state of the bowels. The receptacles which nature has provided for the temporary retention of the secretions and excretions, particularly the biliary and urinary bladders, react imperfectly on their contents, owing to the lowered power of the nerves which actuate them: hence arise distension

from the inordinate accumulation of the secretions poured into them, and changes of the properties of these secretions during their retention, either occasioning their expulsion, or producing actual disease.

54. As closely related, also, to the lowered energy of the nerves of organic life, and consequent languor of the circulation, the generation of animal heat in the aged is evidently diminished, although the causes which usually moderate it in the young, — namely, abundant exhalation and evaporation from the surfaces of the lungs and skin, — exist in a much less degree in the former. The functions of generation are, however, those most remarkably affected. In the female the faculty of conception is altogether abolished, and important changes occur in the state of her appropriate organs; yet the sexual desire still lingers for a while: and in the male, although the ability of procreation may remain, under favourable circumstances, for some time, it is at last entirely abolished.

55. Thus we perceive, that as the different viscera of organic life increase in density, and experience a diminution of vital expansibility and contractility, so their functions become more languid or imperfect, until some of them cease to be performed, and others are remarkably altered. But the change is not limited to this class of structures. Those organs which are devoted to the extension of our intercourse with surrounding nature, and are subservient to the manifestations of mind, as well as those manifestations themselves, in both their intellectual and moral relations, undergo, although at a more advanced period, in respect of some of them, very marked modifications.

56. The changes that take place in the muscular and their associated structures evidently would render them incapable of performing those actions, to which volition may impel them, with energy, rapidity, and steadiness, even although the nervous system of voluntary motion were altogether unaffected. But this system, owing probably to those slight, and nearly unappreciable, alterations noticed above (§ 36.), possesses much less energy and susceptibility of action than in the prime of life, and therefore actuates the muscles in a less vigorous manner.

57. The same condition of the brain and cerebro-spinal nerves, which contributes to render the actions of volition less precise and energetic, seems also to be connected with the less vigorous exercise of the intellectual powers, and the imperfect conditions of the functions of sense. These functions generally indicate incipient decay before the powers of mind are affected; and some of them are nearly abolished, particularly hearing and seeing, before the latter evince any marked change. But more commonly the decay of the senses is soon followed, occasionally as a necessary result, by a slight failure of some of the mental faculties. The memory, and the power of association as intimately related to memory, are the first to evince this declension, generally by a want of recollection of the names of persons, subsequently of the names of things and of recent events, or recently detailed information; the judgment continuing either altogether or but slightly impaired. With this declining state of the faculties, the emotions of the mind are often remarkably blunted; the desires and affections are

impaired, excepting in as far as respect early-formed associations and affections, which are often recalled with acute and even overwhelming emotion.

58. As age advances sleep is much lessened; and not only is the duration of repose abridged, but also its soundness; the rest of the aged being imperfect, and disturbed by dreams. It is difficult to explain this — indeed no satisfactory explanation of it has yet been offered; but it is generally observed, particularly in very advanced age.

59. Such are the changes induced by age in the various structures and functions of the body, as evidently caused by the gradual decline of the vital energy, from the period of full manhood to its ultimate extinction. I have described them as much divested as possible of the effects of disease. As now noticed, those changes gradually lapse into death, — the lamp of life having burnt out, its oil having been exhausted, after a gradual diminution of the supply, without any single organ evincing that state of disease to which the cessation of life can be ascribed. This is, however, not a common occurrence; for, during the gradual decay that marks the progress of age, some organ or other, owing to the deleterious influence of surrounding agents, or of mental emotions, and the weak resistance of the vital influence, experiences a more or less marked derangement, which increases to actual disease, and either abridges the remaining short period of existence, or renders it less supportable.

I now proceed to notice the different epochs of advanced age, with reference chiefly to the diseases incidental to each, and to the therapeutical considerations which should influence the treatment of them. (See CLIMACTERIC DISEASE.)

60. *1st Epoch, or declining age* extends from forty or forty-two to fifty-two in the female, and from forty-eight to sixty in the male. *a.* During this period the appetites, occupations, and habits express themselves still more strongly upon the outward appearance of the frame than in that immediately preceding it; and the feelings, emotions, disappointments, and anxieties of life manifest more fully their effects upon the internal organs, as well as upon the external aspect. Venous congestions, visceral obstructions and engorgements, with all the specific forms of disease already enumerated, (§30.) are more frequent than during earlier epochs, particularly apoplexy and paralysis, hæmorrhoids, hepatic disorder, dropsies, structural change in the kidneys and bladder, hypochondriasis, hæmatemesis, gout, and chronic affections of the respiratory organs.

61. *b.* In this period, the second great change to which the constitution of the female is liable generally occurs, terminating that epoch in which her sexual constitution is especially marked; and with this change frequently commence, or are matured, several diseases of the female organs. Morbid changes of the uterus and its appendages, as well as of the breast, are now very frequent; and sometimes they assume a malignant character. Various maladies, to which the female was less exposed than the male, are now oftener met with; and her constitution, with its disposition to disease, approaches more nearly to that of the male than during the time of marked uterine activity.

62. *2d Epoch, or green old age*, may be reck-

oned to commence about 53, and to extend to 60 or 65 for the female; and to begin about 60, and extend to 65 or 70, in the male. During this epoch the nervous, circulating, and muscular energies begin to languish, with the vital actions of the different internal organs. The functions of the sexual organs gradually disappear. The female no longer conceives; and sexual plethora ceases to supervene and to relieve itself by a periodical discharge. The ovaria begin now to be gradually diminished in bulk, and to assume a firmer structure; the appetite for procreation slowly disappearing (§43.54.). The male organs also either become less disposed to their proper functions, or nearly altogether lose the faculty of performing them, particularly when the energies of the constitution have been exhausted by previous indulgences carried to an excessive length, or by mental exertions. The teeth decay, and the digestive functions suffer from the imperfect mastication of the food (§41.).

63. *3d Epoch, or ripe old age*, dates from the preceding, and extends to 70 or 75 in the female, and to 75 or 80 in the male. During this term the sensiferous and sanguiferous systems languish more and more, and all the vital organs experience a rapid decline of activity. The teeth fall out, the gums are partially absorbed, and the digestive functions are greatly impaired. The sexual organs are nearly or altogether deprived of their functions; the digestive and assimilating viscera experience a marked diminution of power; and senile marasmus, or the leanness of old age, advances (§53.).

64. *a.* The diseases of this and the preceding epochs are chiefly weak or imperfect digestion and assimilation; chronic inflammations; general asthenia and cachexia; apoplexies; paralysis; loss of the senses of sight and hearing; senile gangrene; comatose affections; dyspnoea; diseases of the heart and liver; dropsies; organic changes in the urinary and sexual organs of both sexes; passive hæmorrhages, from the stomach, bowels, and urinary organs; mental disorder; and gradual extinction of the vital functions and energies. Febrile and inflammatory diseases have a much more marked disposition to terminate in organic change, owing to the diminution of vital resistance, than during the preceding epochs of life.

65. *b.* The therapeutical indications of this period are in some respects important, but chiefly with reference to the necessity of supporting the powers of life during the diseases to which it is liable. When inflammatory or febrile disorder is present, and depletions or evacuations are necessary, we should, particularly if we employ them actively, watch their effects, and resort to the use of means calculated to support the frame as soon as indications of exhaustion are manifested. Purgatives at this period should, if frequently repeated, always be combined with warm, tonic, or supporting medicines, or with a restorative regimen; and a strict reference ought to be made to the habits, constitutional powers, and feelings of the patient, in all the remedies we prescribe. Old habits must not be suddenly relinquished or opposed, and the powers of life should be carefully watched; for, if unheedingly reduced, they will, particularly in large cities, often sink most rapidly, without the power of rallying. When we

consider that, in persons advanced to this age, a considerable portion of the arterial system is often in a state of slow organic disease; that the venous system is prone to congestion, is sometimes relaxed and almost varicose, always deficient in vital contractility, and scarcely able to perform its functions; and that both the one and the other cannot thereby so readily accommodate themselves to sudden or copious losses of blood as in early life and when they are perfectly free from disease, we cannot be surprised at the sudden depression occasioned by vascular depletion, or other means which produce a rapid discharge by the emunctories of the watery parts of the blood, or a sudden depression of the nervous energy, even although symptoms seemed unequivocally to demand their employment.

66. The last epoch, or that of DECRETITUDE, or second infancy, commences at 70 or 75 in the female, and at 75 or 80 in the male, and terminates the life of those whose span of existence is thus far prolonged. During this period, all the physical and mental powers rapidly decline. The body emaciates, the muscles waste, and the adipose structure is absorbed; the integuments becoming lax, wrinkled, dry, and disposed to retain accumulations of sordes. The knees totter and bend under the weight of the body; the trunk stoops and is incapable of any considerable motion, excepting forwards; and the features are wan, devoid of colour, wrinkled, and emaciated, and apparently consisting chiefly of integumental coverings (33.).

67. a. Congestions, enlargements, obstructions, and even atrophy of the internal viscera; effusions of fluid into the shut cavities; irregularity of the heart's action from loss of its vital activity, or structural change of its valves, its arteries, or muscular texture, or from disproportion between the capacities of its compartments; lesions of the vascular system generally, in which either those of the arteries or of the veins predominate. Passive hemorrhages from the mucous surfaces, particularly those of the alimentary canal and urinary apparatus; general asthenia, or cachexia; and slow extinction of the vital and natural functions of the frame, — the ganglial, the cerebro-spinal, and the circulating systems; and the digestive, the respiratory, the secreting, and excreting organs, evincing individually, or either of them conjointly with others, more or less disease, — are the principal causes of death: and thus man, whose mental and physical constitution and organisation were objects of profound study and admiration to himself, passes away; the vital essence, that actuated the wisely devised frame with which it was so surprisingly associated, returning to the Divine source whence it emanated; and the gross materials, which it combined and preserved in wonderful states of association, assuming novel modes of existence, and serving to form new beings much lower in the scale of organised creation.

68. b. The rapidity with which acute disease generally runs its course at this period, and the celerity with which organic change will frequently supervene and extinguish the dimly burning tapes of life, require great decision and circumspection on the part of the physician. The resistance which the energies of life usually oppose, both to the extension of disease to other viscera from that first attacked, and to its disorganising effects in

its primary seat, is now so excessively weakened, that remedies, directed with a due regard to the previous habits of the patient, in support of those energies are particularly necessary. On the choice of cordial remedies, and on their appropriate application to the circumstances of individual cases, will depend their success, and the reputation of the physician. At this period, depletions and all evacuations, excepting such as are requisite to carry off accumulations of morbid matters from the *primæ viæ*, and which impart, along with their evacuating operation, a restorative and cordial influence, must be abstained from; and care should be taken that fainting, or even nervous depression, may not supervene from their action. Warmth, at this and the preceding terms of advanced age, is indispensably required, both in the clothing and apartments; but it should be equable, and not too high. The lungs of very aged persons should be guarded from the ingress of very cold air, as the impression of cold in this organ paralyses its functions, arrests those changes which the blood undergoes during respiration, and induces apoplectic or comatose seizures, and idiopathic syncope or inaction of the heart. For these reasons, also, atmospherical vicissitudes should be assiduously avoided, as far as the means of doing so are placed within our reach. There is scarcely any measure more influential in supporting the sinking vital energies of age as the communication of animal warmth, particularly from the young of our own species. This was well known to the ancients, and is one of the oldest restorative means of treatment practised, having been adopted by David. The aged ought also to avoid the use of very cold fluids, as being apt to depress the energy of the stomach below the power of healthy re-action. Medicines, also, particularly purgatives of a cold nature, as the neutral salts, if exhibited at all, require to be combined with warm aromatics or stimulants, in order to counteract their depressing influence upon the alimentary canal, and on the nerves of organic life.

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AGEUSTIA. See TASTE, Defect or Loss of.

AGRYPNIA. See SLEEPLESSNESS.

AGUE. See FEVER — INTERMITTENT FEVERS.

AIR. See **DISEASE**, its *Causation*, *Removal*, &c.

ALOPECIA. See **HAIR**, the *Loss* of.

ALUSIA. See **ILLUSION**.

AMAUROSIS, from *αμαρψς*, obscure. **SYN.**

Gutta Serena, *Suffusio Nigra*, Celsus, Lucretius, Pliny. *Obscuritas*, *Hebetudo*, Paulus A'gin. *Paropsis Amaurosis*, Good. *Cataracta Nigra*, Auct. Germ. quibusd. *l'Amaurose*, Fr. *Die Schwarze Staar*, Germ. *Gotta Serena*, Ital. *Stekelintheit*, Hol. *Suffusio*, *Drop Serene*, Milton. *Dimness of Sight*, *Blindness*.

CLASSIF. 4. *Class*, Local Diseases; 1. *Order*, Impaired Sensations (*Cullen*). 4. *Class*, Diseases of the Nervous Function; 2. *Order*, Affecting the Sensations (*Good*). *Functional Amaurosis*, 1. *CLASS*, IV. *ORDER*. *Organic Amaurosis*, IV. *CLASS*, III. *ORDER* (*Author*, see the *Preface*).

1. **DEFIN.** *Partial or total blindness, from affection of the retina, or of the nerves, or of that part of the brain related to the organ of sight, whether arising primarily from functional disorder, congestion, inflammation, or any other change of these parts; or occurring from sympathy with other organs. Or, in other words, Partial or total loss of sight, from other causes than those which obstruct the passage of the rays of light to the bottom of the eye.*

2. Amaurosis is met with at all ages; but most frequently in the more advanced terms of life. It is sometimes congenital; and in these cases it is often difficult to ascertain the nature and seat of the affection. When it occurs at advanced periods of life, an attentive enquiry into the history of the disease, of the previous habits and ailments of the patient, and of the various resulting and related morbid phenomena, will generally throw light upon its pathology.

3. I. **SEAT OF AMAUROSIS.**—1st, *In the retina*. Viewing the delicate structure of the retina; its relation to the optic nerve, of which it is an expansion of great tenacity; its connection with the choroid and hyaloid membrane, and its nervous and vascular communications; and considering the various morbid states it is liable to undergo, in consequence of its relations with these and other parts; a partial, and even total, abolition of its functions is to be looked for on some occasions. It is, like all other parts of the frame, liable to congestion and inflammation, with their usual results; and, like other nervous parts, its functions are subject to a partial or complete extinction without itself evincing any change of structure, its sensibility alone being impaired or abolished; owing either to some unappreciable change, or to some one or more of those alterations in its adjoining or related parts about to be noticed.

4. 2d, *In the optic nerves*. These nerves may be more or less changed in some part of their course, from the anterior pair of the corpora quadrigemina, along the thalami, the tubera cinerea, and their partial decussation, until they terminate in the formation of the retina. In appreciating, however, lesions in the course of the optic nerves, the results of experiments on them should be taken into consideration:—if an optic nerve be divided previous to this decussation, sight is altogether lost on the opposite side; but if the division be made between the decussation and the eye, vision is lost on the same side.

5. 3d, *In the ganglionic nerves*. There is every rea-

son to suppose that the retina is in intimate communication with other nerves, and that it mutually influences and is influenced by them. Branches of the great sympathetic may be traced upwards, from the first cervical ganglion, to the ganglion lodged in the cavernous sinus, whence branches proceed and communicate with the third, the first division of the fifth, and sixth pairs of nerves. Branches also pass from the cavernous ganglion directly to the lenticular ganglion. As the internal carotid artery passes into the cranium, it is surrounded by the sympathetic nerves, which accompany all its ramifications. The ophthalmic artery is invested with these nerves; its branches to the choroid, iris, and retina being similarly provided. Branches of nerves, moreover, proceed from the lenticular ganglion, as M. RIVS* and others have demonstrated, to the iris, giving more minute branches in their course to the retina. This connection being established, morbid states of these nerves and ganglia, or changes of structure in their vicinity affecting their functions, must necessarily impair the sense of sight.

6. 4th, *Other nerves*, as the fifth and third pair, are, in some cases, also the seat of amaurosis. It has been shown by MAGENDIE and DESMOULINS that the integrity of the fifth pair is necessary to the perfect function of the retina; and MR MAYO has furnished evidence that the third pair is requisite to the motions of the pupil. If the great sympathetic be divided; the upper part of the neck, the pupil becomes contracted and immovable, and the eye wastes.

7. 5th, *Parts of the encephalon* connected with the optic nerves in their course are occasionally the seat of amaurosis, as pathological research and experiment have shown. MM. MAGENDIE and SERRAS have proved that, when these parts are wounded, the sight of the opposite eye becomes either weak or extinct.

8. 6th, The *pineal* and *pituitary* glands are frequently the only parts in which any alteration can be detected in the examination of amaurotic subjects. The connection of these glands with the ganglionic system is stated at another place. Besides these, other parts of the brain, when the seat of organic disease, are not infrequently the principal source of amaurosis, as shown hereafter.

9. II. **CAUSES.**—1st, *The predisposing causes* of amaurosis are very diversified. Amongst these, the influence of hereditary disposition is well established. BERN traced it in several families; in one of them through three successive generations, and particularly in the females of that family who had not borne children, it having appeared in them at the cessation of the menses. BERN also states, that dark eyes are much more liable to it than the light; the proportion being upwards of twenty to one.

10. Whatever tends to favour sanguineous congestion of, or serous effusion in, the encephalon, particularly insolation; forced exertions of the mind or body; excesses of passion; the pregnant and puerperal states; occupations requiring frequent stooping; errors of diet, and neglected ailments affecting the stomach and liver; the abuse of wine or spirituous liquors; suppressed discharges, particularly those from the nose and ears; interruption, or entire cessation, of the

menses; the gouty, rheumatic, and strumous diathesis; the retrocession or suppression of eruptive diseases; and habitual constipation;—whatever exhausts the vital energy of the brain; and nerves supplying the organ, as chronic diarrhoea, typhoid fevers, the excessive use of snuff, long-continued grief, prolonged suckling, neglected fluor albus, excessive venery, and masturbation;—and lastly, whatever exhausts slowly the sensibility of the organs of sight themselves; as the incautious use of the eyes in a glaring light or on minute objects, and the existence of strumous ophthalmia in childhood, generally *pre-dispose* to amaurosis.

11. 2d, The *exciting causes* are very numerous; indeed, any of the causes enumerated as merely predisposing to the affection may excite it, when acting long or intensely, although the successive or combined action of various causes are generally required. Amongst the most common exciting causes, are over-exertion of the sight; exposure to very bright light; its occupation on minute objects, or employment in candle or lamp light, and during the hours usually devoted to sleep. The sensibility of the retina may be destroyed, even by a single exposure to these causes. Lightning is another cause, which seems to act by extinguishing the sensibility of this very delicate part. In general, however, it is the long-continued over-excitement of the organs of sight that occasions the gradual abolition of their functions. Injuries on the eye, and in its vicinity, are also frequent causes of the disease.

12. Poisonous substances occasionally produce an attack of amaurosis; sometimes suddenly, at other times slowly. Belladonna, stramonium, solanum dulcamara, &c., fish-poison, various fungi, and animal poisons, occasionally have the former effect; but it is most frequently only of temporary duration; whilst other narcotics taken habitually, as opium and tobacco, produce the latter effect, and in a more permanent manner. The poison of lead, blows on the head, child-labour, and puerperal convulsion, frequent attacks of epileptic or other convulsions, cerebral apoplexies and paralysis, injuries of the branches of the fifth pair of nerves (three cases of which have come before me), and even irritation of these nerves, will produce this affection; it has also been observed to supervene to gastric and intestinal irritation, particularly when occasioned by worms; to hypochondriasis, and accumulations of bile in the liver, &c., to frights, and to the irritation proceeding from carious teeth. The sudden suppression of epistaxis, of hemorrhoids of the lochia, of the milk in nurses, of the menses, or of the perspiration; the repulsion of eruptions on the head and behind the ears, and the drying up of old ulcers, have, severally, occasioned the disease. But most frequently it is the result of two or more of these causes, acting under circumstances of predisposition. Females with dark eyes are extremely liable to the disease, upon the cessation of the menses; and, like deafness, it is apt to appear after severe attacks of typhoid and scarlet fevers. Amongst the more rare exciting causes of this affection, are the gouty and rheumatic diathesis, or misplaced and retrocedent gout and rheumatism; the constitutional effects of syphilis, and hurtful influence of mercurial courses;—all which have been assigned as

causes of the disease by some authors, and denied by others; but, undoubtedly, producing it on some occasions, although not so frequently as the former believe.

13. 3d, The *proximate or efficient causes* of this affection are various. It has been disputed whether or not it can arise from altered function only, and without change of structure. Mr. TRAVERS believes that it does, but Mr. MACKENZIE denies it can depend upon morbid function merely; and other writers take opposite sides of the question. There can, however, be no doubt, if we attentively consider the disease in relation to the exciting causes and the effects which are observed to result from them, that, although most commonly the consequence of some appreciable change in some one or more of those parts instanced as its seat (§3—6.), it is occasionally unattended with such change,—at least to such an extent as our observation of the effects proceeding from similar alterations would lead us to expect. It should not be overlooked that the operation of many of the causes which have been adduced above is entirely vital—upon the functions of life, as manifested in the organ, or in remote parts of the frame;—that their effects are sometimes almost instant, and before organic change could have been produced; and that the disappearance of their effects has been sometimes as sudden, and often before the restoration of morbid structure, providing that it existed, could have been brought about. I believe, after a careful perusal of the works which have been furnished by surgeons on this disease, that a too marked disposition has been evinced to consider it as a result of organic change in the organ and the nerves, and vessels connected with it, and without relation to constitutional and vital causes.

14. When describing the *seat* of amaurosis, the influence of organic changes has been briefly noticed; and a fuller reference to them will be made in the sequel. Amongst the numerous lesions of structure that occur in the brain and its membranes, there are many that affect the nerves of sight, more particularly the optic nerves, or which implicate them organically in some part of their course in a very remarkable manner. Alterations in the bones of the cranium, as well in the membranes, obstructing the functions either of these nerves or of the other nerves subservient to the perfect exercise of this important sense, are also not uncommon.

15. THE EFFICIENT CAUSES of this affection, therefore, are, 1st, *vital or functional*, depending upon imperfect or abolished sensibility of the retina, or of the optic and other nerves subservient to vision, owing either to causes which, from their direct and local action, depress or exhaust this property, or to those which, from their primary influence upon the frame, have an indirect depressing effect, which is not limited to this organ, although manifested in it in a more marked degree, owing to various concurrent circumstances. This constitutes the *functional form* of amaurosis admitted by BEER, WARDROP, TRAVERS, SANSON, and others, and which BEER divides into two subordinate kinds: *first*, that which proceeds from direct depression of the vital sensibility of the eye; and, *second*, that which is owing to inordinate excitement, and consequent exhaustion of this property.

16. 2d, *A congestive or inflammatory state of the vessels of the retina, or parts immediately adjoining, or the usual effects of these states.*

PORTAL, PLOUQUET, PROCHASKA, ROUSSEAU, SANSON, MAGENDIE, and other pathologists, have observed varicose states of these vessels; unusual injection of the minute arteries of the adjoining coats, and of the retina itself; a complete retinitis; exudations of lymph under the choroid, near the ciliary circle; inflammation of the external surface of the sclerotic; vascular injection, and firm adhesion of the retina to the choroid; partial detachment of the retina from this coat; and thickening, morbid density, and change of colour of the retina. Ossification; fibrous degeneration, with partial thickening; wasting, and malignant disease of the retina, and even the development of transparent vesicles in it, have all been noticed by HALLER, MORGAGNI, HEISTER, SANSON, and other authors.

17. 3d, *Lesions affecting the optic nerves.*

These consist chiefly of tumours of various kinds—osseous, fibrous, encysted, steatomatous, puriform, aneurismal, &c.—formed in their vicinity, either in the brain, the membranes, or in the bones of the cranium, and involving, or compressing them, in any part of their course. They are likewise, occasionally, the seat of some one, or even more, of those organic changes of their proper structure and sheaths, to which nervous parts are liable. Their vessels may be varicose; their fibres may be infiltrated with serum; they may be injured by external violence, and they may be wasted; which last is very frequently observed. Adventitious deposits, as osseous and earthy matter, malignant formations, cysts and hydatids, may even form in their sheaths, although more rarely than the foregoing lesions. The writings of pathologists abound with instances of these changes. When only one eye has been amaurotic, the optic nerve of that side has been found wasted anterior to its partial decussation; and on the opposite side, posterior to this union. But this is by no means an uniform circumstance, and, when observed, the atrophy is not distinctly continuous. Indeed, the wasting has been detected on the same side, after the union of these nerves, as well as before. But if the opinion of TREVINIUS and WOLLASTON be correct,—that decussation of these nerves at their union is only partial, and that it takes place chiefly between the parts which are nearest each other,—wasting of one of them may be in one case more remarkable on the same side, and in another case more observable on the opposite side. When the amaurosis is accompanied with wasting of the optic nerve, from causes not primarily consisting of inflammation or its consequences in the retina or adjoining coats, this nervous expansion is also generally wasted, transparent, or changed in colour. When the cause exists in the pineal or pituitary glands, the wasting is often chiefly observable at the union of the optic nerves. In these cases, both eyes are affected. Facts illustrative of this have been recorded by VIEUSSENS, DE HAEM, RULLIER, RAYER, WARD, and SANSON.

18. 4th, *Lesions seated in the encephalon.* The scope of this article will not admit of further reference to the numerous changes which occasionally produce amaurosis, from their affecting

the optic nerves in their different connections with various parts of the encephalon. All the alterations which are described in the articles on morbid structures of the brain and its membranes, will produce the disease, when they impede the functions of the optic nerves, although the structure of these nerves may be uninjured. The most frequent and remarkable of these are, organic lesions of the pineal and pituitary glands (§ 8.), sanguineous and serous effusions, various kinds of tumours, abscesses, softening of the brain, &c.

19. 5th, *Lesions of nerves subsidiary to the integrity of the organ and of its functions.* Injuries, compression, and even irritation of these are, organic of nerves, particularly its ophthalmic branch, of the third and sixth pairs, and of the ganglia or their ramifications, by organic change in the brain, its membranes, bones of the cranium, or parts in the course of their branches, have been shown, in numerous instances, to have been the chief efficient causes of amaurosis.

20. III. SYMPTOMS.—The symptoms of amaurosis are, 1st, those which the patient himself experiences; and 2d, those which the physician detects in the eyes, or in the various organic and animal functions. Each of these classes of symptoms are to be enquired into separately, commencing with either of them. Each eye should be carefully and separately examined; and it will be better that the other is excluded from the light, whilst the examination is being made.

21. 1st, The patient complains of impaired vision, which may be of gradual access, or, remarkably sudden, and amounting to almost total deprivation of sight. Hence the disease has been distinguished by the epithets *slow and sudden*, *incomplete and complete*, or *imperfect and perfect*.

22. At the commencement, the failure of vision is sometimes only occasional, for a short time, and after longer or shorter intervals (*amaurosis vaga*). In some cases, it assumes the form of *day-blindness*, in others of *night-blindness*: and it not infrequently recurs for a time after great exertion of the eyes, either with minute or bright objects. Transient and sudden attacks of the disease are often the consequence of disorder of the digestive organs, or rather the result of a state of the vital manifestations which occasions equally loss of sight as well as loss of the digestive functions. The failure of sight is often at first only partial—extending only to a part of the field of vision. In some cases intervening portions of the field are obscured (*visus interruptus*). In other cases, one half of it is hid from view (*hemipopia*). Occasionally objects are only seen in a particular direction (*visus obliquus*); and some patients discern objects in a distorted form—crooked, mutilated, shortened, lengthened, or inverted (*visus figuratus*). BERK states that the flame of a candle will often appear elongated, and as if separated into several portions, to such patients,—a symptom indicating disease within the head.

23. In some instances the failure of sight assumes a *myopic* or a *presbyopic* form: but this is not so frequent as the occurrence of false impressions, in the form either of flashes of light, shining stars, globes of light, and various other lucid spectra (*photopsia*), or of muscæ volitantes. False impressions of colour (*chropsia*) are also frequent attendants on the early stages of amaurosis. Luminous spectra are commonly met with in plethoric

persons, and when the amaurosis depends upon increased vascularity, or inflammation of the retina; motes, black specks, *muscæ volitantes*, and thick mists or clouds, when the affection is dependent upon exhaustion of the sensibility and vital energy of the organ, and when it occurs in dyspeptic subjects from exhausting causes. Double vision is also a common symptom, particularly when the cause exists within the head.

24. As the disease advances, the field of vision appears as if obscured by a cloud, or net-work; the latter appearing grey or black in a good light, but occasionally becoming white, silvery, yellowish red, and luminous in the dark. In addition to these, the patient sometimes complains, particularly early in the disease, of some intolerance of light, or of pain in the eyes on being exposed to it. But, in other cases, from the very beginning, diminished sensibility of the retina, and a constant desire for a stronger light—a thirst of light—are present.

25. Pain in the eyes, and commonly also in the head, is one of the most important symptoms of amaurosis. It should, therefore, be carefully investigated. We ought to ascertain its precise seat and extent; its character—whether it be acute, gravative, throbbing, occasional, or permanent: The circumstances which relieve or exasperate it should also be noted; as the horizontal posture, temperature, exercise, diet, the use of stimuli, &c. We should also notice whether it be accompanied with vertigo, tinnitus aurium, watchfulness, or stupor, coma, forgetfulness, inability of exertion, or failure of other mental manifestations; as, from the nature and grouping of these symptoms, we infer the nature of the efficient cause of the disease, particularly as they suggest its existence within the cranium.

26. Unusual dryness of the eyes and nostrils sometimes is observed in amaurosis; and in these cases benefit is often derived from a restoration of the secretions of the lachrymal gland, conjunctiva, and Schneiderian membrane. (MACKENZIE.)

27. The general health, and previous ailments of the patient, require a particular investigation. The constitution and diathesis—whether he be strumous or gouty; whether he has had syphilis, or undergone long courses of mercury; whether he has had typhoid fevers, or inflammations of the brain, or apoplexy, paralysis, epilepsy, or injuries on the head; whether he has been subject to complaints of the digestive organs, or has been, or is, affected with worms: In a female, whether she has been frequently attacked with paroxysms of hysteria, or any of its anomalous forms, or with convulsions in the puerperal state, and particularly whether or no there exist any sign of disorder in the uterine organs—are all particulars most requisite to be known.

28. 2d, The form, colour, vascularity, and mobility of the different parts of the eye, and habit and appearance of the patient, next require investigation. The amaurotic patient walks with a gait of uncertainty, and a staring and unmeaning look. In some cases this want of convergency of the eyes towards an object may amount to slight squinting, occasionally with oscillation, and sometimes with unusual fixity of the eyes. In some instances, the motions of the eyelids, and of the eyes themselves, are more or less impeded, or even palsied,—the *levator palpebræ superioris*, and the orbicu-

laris *palpebrarum* being often affected. These phenomena are chiefly remarked in cases where the motor oculi, or the facial nerve, is injured.

29. One or both eyes are often unusually prominent. The colour of the sclerotica is frequently somewhat changed—being either yellowish, bluish, or ash-coloured. This coat is often covered with small varicose veins. The consistence, also, of amaurotic eyes is occasionally altered; in some cases the eyeball is firmer to the touch, in others softer, than natural. In rarer instances, it is flattened on one or more of its sides.

30. The pupil is generally sluggish and limited in its motions, or altogether deprived of motion, and dilated. More rarely it is contracted. In many cases it is neither dilated nor contracted. A widely dilated pupil, although generally attendant on pressure on the brain, also occasionally depends on other causes. Early or incomplete amaurosis is rarely attended with dilated pupil; but after all vision is extinct, the pupil is generally more or less expanded and motionless. It should not be overlooked, that where only one eye is amaurotic, the motions of the pupil of the affected organ will often follow those of the sound one, when protected from, or exposed to light; and even, as observed by JANIN, both eyes may be completely amaurotic, and yet both pupils will vary in diameter with the intensity of light to which they are exposed. This phenomenon can only be explained by referring to the nerves supplying the different parts of the organ. The iris, being chiefly supplied with ganglionic nerves, will often retain its faculty of motion, when the efficient cause of the disease affects the optic nerves at any place between their origin and their communication with the third pair; or when the affection of the optic nerves within the cranium does not leave the retina altogether deprived of sensibility, although the impression cannot be conveyed to the brain, the subsidiary nerves, particularly the third and fifth pairs, and the branches from the cavernous and lenticular ganglions, still bestowing sufficient sensibility and mobility on the iris to admit of motion on being stimulated.

31. Besides the size of the pupil, it is necessary to attend to the characters of the motions of the iris. This part may contract on one side, or in one part, drawing the pupil to one side, or giving it an irregular appearance. It may also seem as protruded towards the cornea, or it may appear sunk inwards, and have a funnel-like shape. (MACKENZIE.)

32. The appearance of the humours of the eye is also important. In *hydræphalus*, or when occurring in young subjects, the pupil has the natural black hue. But in elderly subjects some degree of glaucoma accompanies amaurosis. This appearance is in general unfavourable.

33. The presence of the marks of injuries about the face and head is important, as marking probable injury of parts within the cranium, or of some nerves subservient to the perfect condition of the organ. The character of the countenance, the shape of the head, the state of the vessels of the head and eyes, and the general habit of body, require to be noticed. The inference which ought to be drawn as to the exact nature of the disease will be very different when it is met with in the plethoric, the highly fed, and the indolent, from that which will be deduced from its occurrence in

the emaciated, or exhausted subject. The probable predisposing and exciting causes should also be investigated, as they have an obvious relation to their effects. Attention should be directed to the previous habits, indulgences, ailments, occupations, and modes of life of the patient, &c., with the view of throwing light upon the causes and pathological relations of the malady.

34. The duration of the disease is extremely various. It may, in slighter cases, be only of a few hours' or days' continuance; may altogether disappear, either spontaneously or from treatment, and never afterwards recur; or it may return after an indefinite period, from errors in diet, disorders of the digestive organs, or from the operation of the causes usually producing the disease. It very frequently continues all the life of the patient.

35. IV. STAGES, GRADES, AND FORMS. — The stages of amaurosis are *incipient* and *confirmed*. In the former the sight is generally not altogether lost, although more or less impaired. Treatment will often retard or check the progress of the disease, and sometimes even bring about a perfect cure. But the blindness may be complete from the first: in this case, medicines are generally without effect. In the *confirmed* stage, the disease is usually stationary; but the sight is not always altogether lost: the patient often retaining a perception of light and shadow, or even of objects, when illuminated or strongly contrasted. When this power of distinguishing any object or colour is still retained, even in the slightest degree, the amaurosis is said to be *incomplete*. When the patient is insensible even to the presence of light, the disease is *complete*. It may be limited to one eye, in the incipient or incomplete states; or it may affect both equally, either in an incomplete or complete form. It may also be incipient in one eye, and confirmed in the other; and it may be more or less complete in either. It may likewise, in one or other of these states or forms, assume a *recurrent* or *remittent* type; but such cases are comparatively rare.

36. But, besides these stages and grades of the disease, other forms occasionally present themselves, which will be more fully noticed in the sequel. It may be *Idiopathic*, depending upon changes, either *functional* or *organic*, taking place *primarily* in the nervous apparatus of the eye, and existing *simply*, and without any other associated lesion: or it may be *complicated* with lesions of adjoining parts, or with other diseases of the eye, particularly of its humours, more especially with glaucoma and cataract. It may also be *consecutive* of other diseases; most frequently of organic changes within the head, or in the vicinity of the orbit, as in apoplexy, paralysis, &c. And, lastly, it may be *symptomatic* of, or supervening to, pre-existent disease of distant parts, particularly of the abdominal viscera; or it may be occasioned by pregnancy, and more rarely by diseases of the puerperal state. It is not infrequently thus symptomatic of colic from lead, accumulations of fecal matters in the large bowels, hypochondriasis, &c.

37. According to these states of the disease, its different species will next be considered, and the treatment which is appropriate to each of them will subsequently be pointed out: for it is obvious, that the success of remedies will, in this very difficult and variously complicated disease, mainly depend upon the strict appropriation of remedies to its different varieties and states.

38. *Spec. 1st, Functional Amaurosis.* This form of the disease generally arises, — 1st, from suspension or exhaustion of nervous and sensorial power; from various local and constitutional causes (§ 13.); from inordinate excitement or exertion of the visual organs; from mental exertion, watchfulness, and sedentary habits; from the deleterious action of mineral, vegetable, and animal poisons, as lead, mercury, narcotics, &c.: 2d, from venereal indulgences; excessive secretions and evacuations; depression of the vital energies from diseases of debility and exhaustion: and 3d, from temporary diminution of the local circulation; from simple congestion, or occasional determination of blood in the veins or arteries; and from the irritation or disturbance of the digestive organs, or of some other of the abdominal viscera.

39. The symptoms of this species are, chiefly, more or less obscurity of vision, occurring slowly or suddenly, the visus nebulosus, and muscæ volitantes; a somewhat contracted pupil, and clear state of the humours; equal imperfection of sight in both eyes; pale, languid countenance, and depression of the eyes in the orbits; a languid, small, or weak pulse; increased dimness, or sudden abolition of sight upon quickly assuming the erect, from the horizontal posture. An improved state of the sight after a light meal, or grateful stimulus; nervous headaches; weak digestion, sluggish state of the bowels, flatulency, foul or loaded tongue, and indisposition for, as well as incapacity of, physical or mental exertion or occupation; weakness in the joints; occasionally nocturnal emissions, &c. in the male, and leucorrhœa in the female.

40. This species of amaurosis may be, 1st, *primary*, and *uncomplicated*. In this case it usually proceeds from causes which depress or exhaust the sensibility of the retina and its related nerves. 2d, It may likewise be *consecutive*; particularly of excessive secretions and discharges from the uterus, mammae, kidneys, testes, and prostate; or from exhausting and debilitating diseases, as adynamic diseases, hæmorrhages, &c. 3d, *Symptomatic* of, or *complicated* with, hysteria, hypochondriasis, colica pictoria, diminished vital energy of the digestive organs, and all the various forms of indigestion; the presence of worms in the bowels; pregnancy; obstruction and accumulation of bile in the bile-ducts or bladder, &c.: and 4th, *Metastatic*, or supervening upon impeded or checked secretions and discharges; in which cases it is generally accompanied with congestion, or determination of blood to the head, in which the eyes may partake, but not to an extent constituting inflammatory action or organic change; and it assumes a state nearly approaching to that characterising the next species.

41. *Spec. 2d, Amaurosis from active congestion.* The existence of this species of the disease is more a matter of inference, than almost any other of those in which I have divided the disease. Yet it seems undoubtedly to exist; especially when amaurosis is consequent upon obstructed secretions and discharges, or the drying up of eruptions; upon frequent stooping, or wearing a tight neckcloth; upon fits of passion, when it occurs in plethoric persons; and after narcotic poisons.

42. The symptoms indicating it, are throbbing in the eyes, tinnitus aurium, turgescence of the vessels of the sclerotica and conjunctiva, a some-

what contracted pupil, and clear state of the humours; turgescence of the features, or lividity or bloatedness of the face; fullness of the jugular veins, prominence of the eyes, and impeded circulation through the lungs or cavities of the heart.

43. This form of the disease is seldom *primary* and *uncomplicated*. It is commonly *consecutive*, or *symptomatic*, generally of obstructed discharges, &c. (§ 12.), of disease within the head, particularly of sanguineous congestions, or effusions, and diseases of the lungs and heart. It not infrequently occurs transitorily from pregnancy, epilepsy, and hysteria; and more rarely from gout and rheumatism.

44. *Spec. 3d, Amaurosis from inflammation of the retina, and internal parts of the eye.* In stating amaurosis to be often a symptom merely of retinitis, I am supported by the opinions of many of the best British and Continental writers on the disease. But I believe it very seldom occurs, that the inflammation is limited to this membrane, but that the choroid and iris generally participate with it in the morbid action; and that, when they, on the other hand, are thus affected, the retina is also inflamed. Amaurosis is therefore a consequence of inflammation of the internal structures of the eye: but does inflammation of these parts uniformly produce amaurosis? It is not always consecutive of iritis; and I believe that the retina may be inflamed, and yet but very slight amaurotic symptoms may be occasioned thereby, particularly during the early stages of the retinitis. It is chiefly when the inflammatory action has produced some degree of organic lesion of the affected parts, that amaurosis is manifested.

45. This form of amaurosis generally proceeds from nearly the same cause as the foregoing (§ 10—12.). It may be produced by syphilis, mercury, eruptive and continued fevers, cold in any form acting upon the eyes or face; suppressed discharges, or eruptions on the head or behind the ears; injuries of the eye and adjoining parts; concussions, and the usual causes of inflammation in other parts.

46. The symptoms vary with the extent and intensity of the inflammation. In its slighter states, the progress of the disease, and of the symptoms, is insidious and slow. In these cases, little or no pain is complained of, either in the eye or in the head. The pupil is more commonly contracted than dilated, and the spectra are usually luminous, but sometimes not very sensibly so. With this slight and often chronic state of inflammatory action, the amaurosis may be increasing fast, and the observation of vision very great, and yet the symptoms may not be distinctive; if we except the appearances furnished by the sclerotic, which, in retinitis, as well as in iritis, abounds in red vessels, converging in distinct lines, and forming, by their delicate reticulations, a red zone round the cornea, and which thus furnishes the only symptom, that can be depended upon, of slight or incipient retinitis.

47. In the more intense states of inflammation of the internal parts of the eye, the amaurosis is attended with painful vision; intolerance of light; sparks of fire, or drops of a red colour falling from the eyes; flashes of light; pain darting through the head, either from, or to the bottom of the eyeballs; the pupils are dilated, and the humours

thick or muddy; and there are more or less acceleration of pulse and constitutional disturbance.

48. This species of amaurosis is often *primary* or *idiopathic*; it may also be *simple* or *complicated*. When it occurs in a complicated form, it is, most frequently, associated with iritis, with meningitis, with eruptive or continued fevers, and with rheumatism, gout, or syphilis. It may also occur *consecutively*, and from *metastasis*, particularly after the disappearance of exanthematous eruptions, as in the measles, small-pox, erysipelas; of chronic eruptions; and after the suppression of habitual or periodical discharges, secretions, and evacuations (§ 12.).

49. *Spec. 4th, Amaurosis from advanced disorganization of the retina and adjoining parts.* Disorganization of these parts is usually a result of inflammation. But it is difficult to determine at what stage of the inflammation organic change commences. I am to consider it here as far advanced; yet, the inflammation that occasioned it may be still present. The causes of this species are the same as those of the foregoing; but the symptoms are somewhat different. The vision is more obscured. A film seems interposed between the eye and field of vision. The pupil is sluggish, and it is often scarcely dilated; it is frequently irregular. The margin of the iris sometimes partly adheres to the capsule of the lens. The sclerotic is often very vascular, and even livid, from the enlarged and loaded state of its veins, which are very numerous and tortuous. The shape of the eye is sometimes changed, particularly in the most advanced cases; it is prominent in some parts, and depressed in others. The eyeball is occasionally, also, softer or firmer than natural.

50. This form of amaurosis is always *consecutive* of the second and third species, more particularly of the latter; and hence, participates in many of their characters (§ 41—48.), and occurs under many of the same circumstances as they. It is occasionally complicated with cataract, with opacities of the cornea, or with disorganization of parts within the head.

51. *Spec. 5th, Amaurosis from external injuries of the eyes.* A blow on the eye-ball will not infrequently occasion blindness, without producing any apparent injury of its visible parts. It is difficult, or altogether impossible, to ascertain the nature of the mischief that has been inflicted. The concussion of the organ, and the lesion of the sensibility of the retina and optic nerve, may, in some of the cases, particularly when the consequent amaurosis is merely temporary, constitute the principal or only change. In more permanent and severe instances, it is very probable that the delicate connections of the retina with the adjoining parts are injured. Ecchymosis may also be occasioned, or inflammation may supervene. In these cases the pupil is either dilated, or of an irregular form; and according to the extent of injury will the phenomena partake of the characters which have been assigned to the third and fourth species of the disease.

52. *Spec. 6th, Amaurosis from disease within the head affecting the functions of the optic nerve, or other nerves subservient to the sense of sight.* It is obvious that disease within the cranium, either of the substance of the brain, or of its membranes,

producing pressure of, or interrupted circulation in, the parts with which the optic nerve is connected at its origin, or during its course, or acting in a similar manner on the nerve itself, will produce amaurosis. In these cases it is a *consecutive* affection — a symptom merely of disease, often existing for a long time previously. I have already alluded to the nature of these lesions, and to their extreme diversity (§ 17, 18.). Perhaps the most common and the most interesting of them are organic changes of the pituitary and pineal glands, hæmorrhage, sanguineous congestion, aneurismal and other tumours, &c. In these cases it is very common to find cerebral symptoms complained of long before the sight is affected; and to observe the gradual accession of the disease either in one or both eyes; or first in one and afterwards in another, with complete loss of vision, followed at last by changes of the structure of the eye.

53. When organic lesion of the pituitary and pineal glands has occasioned the disease, judging from the cases recorded by DE HAEN, WENZEL, VIEUSSENS, LEVEQUE, WARD, RULLIER, and RAYER, both eyes are generally gradually and equally affected, after the existence of cerebral symptoms, chiefly consisting of pain and weight referred to the more anterior parts of the head; of a repugnance to exertion, apathy, loss of memory, and weakness of the mental energies. In cases of sanguineous congestion, or hæmorrhages in the situations referred to, the attack is sudden, and the blindness is often not the most remarkable symptom.

54. In some cases resulting from organic disease within the head, cerebral symptoms, particularly those of an acute kind, are not complained of until the amaurosis is far advanced. In its progress, objects frequently seem to the patient disfigured or perverted. In many cases of amaurosis from organic change of the skull, membranes, or brain, the affection commences with intolerance of light, strabismus, giddiness, luminous spectra, convulsive motions of the eyes and eyelids, contracted pupil, and turgescence of the blood-vessels of the eyes, loss of hearing, smell or taste, or both, violent headach, rapidly followed by complete amaurosis, protrusion of the eyeball, and abolition of the external senses and of the powers of mind.

55. This species of amaurosis is often complicated with, or preceded by, epilepsy, paralysis, apoplexy, ottothæra, or disease of the ears, hysteria, and various nervous affections. It is chiefly by attending so these antecedent disorders, or other slighter cerebral symptoms, that we can form any idea of the nature of the amaurosis. The appearance of the eye, and particularly of the pupil, is not to be depended upon; for, although the pupil is usually dilated and immovable, the exceptions are too numerous to admit of considering it as an uniform occurrence.

56. *Spec. 7th, Amaurosis from disease of the optic nerves, or of their sheaths.* This species of amaurosis always advances slowly, generally commencing in one eye, with a black cloud, which grows more and more dense, great disfigurement and perversion of objects, without pain of the head or eye. There is, however, a sensation of pressure at the bottom of the eye, as if forcing the eyeball from its socket. The pupil is generally,

from the commencement, much dilated, and angular from irregular action of the iris. By degrees, according to BEER, glaucomatous change of the vitreous humour supervenes, and afterwards of the lens itself, but without any varicose affection of the vessels of the eye. At last the eyeball becomes somewhat smaller than natural, but complete atrophy does not ensue.

57. *Spec. 8th, Amaurosis from lesions of branches of the fifth nerve, &c.* The experiments of BELL and MACLEODIE first threw light upon this cause or form of amaurosis. I believe that it is by no means infrequent. Four cases of it have come before me in private practice; in three of which the principal trunk or branches of the ophthalmic nerve were implicated. In one of these the amaurosis was very slight; in the other two it was very considerable, although not complete, and was a consecutive phenomenon of very extensive disease. I saw two of them, in consultation with respectable practitioners in my vicinity. The fourth case very recently occurred in a member of my own family. In it the frontal branch on the right side was pressed upon by a common boil; the sight of the eye was nearly altogether lost, but was soon restored when the boil broke.

58. Numerous cases are on record, in which partial amaurosis is said to have occurred after injuries and wounds of the eyebrows, cheeks, and forehead; or from the irritation and extrusion of diseased teeth. The appearance of the disease from these causes was noticed by MORGAGNI, PINEL, BEER, WARDROP, TRAVERS, PENADA, RIBES, &c., before the functions of this nerve were so well known as they are now. Its occurrence from wounds of the eyebrows is mentioned even in the writings of HIPPOCRATES.

59. Amaurosis from these causes is, in some rare instances, complicated with facial neuralgia, toothach, rheumatism of the face, and tumours or abscesses developed in the vicinity of the eye, and within the cranium in the course of the fifth nerve. I met with it in a case of ottothæra, terminating in caries of the bones, and extensive disease of the internal parts in the vicinity. It is also, in some cases, accompanied with paralysis of the upper lid, and in others with paralysis of different muscles of the eye. In these cases, the third or sixth nerves have, most probably, been chiefly affected. When the ophthalmic nerve is affected within the cranium, it is difficult, if not impossible, to determine the particular seat of lesion from the amaurotic symptoms. Facts have not been observed in sufficient number, and with requisite precision, to admit of any statement being made respecting the pupil and motions of the iris in this species of the disease. I believe, however, that serious organic, as well as functional, lesions of the organ may supervene to it.

60. There are other varieties of amaurosis particularised by BEER, WELLER, SANSON, and other German and French writers, some of them of rare or doubtful existence, or at least referrible to the species into which I have here divided the disease. From amongst these I may enumerate the following: — Gouty amaurosis; rheumatic amaurosis; amaurosis from the sudden repulsion, or cure of cutaneous eruptions, or old ulcers; amaurosis from suppressed secretions and evacuations; puerperal amaurosis, &c. It is

evident that these are only occasional, and by no means frequent, causes of the disease, which ought to be kept in recollection by the practitioner, but which can act only by inducing some one or other of the forms into which it has been divided; more particularly the *second, third, fourth, and sixth*. In as far as they may require a modified plan of treatment, they will receive attention in the sequel.

61. In addition to these, I may notice the *cat's-eye amaurosis* of BEER, which is only met with in the old, debilitated, thin, and emaciated; particularly those who are grey, or white-headed. At the commencement of this amaurosis, the iris retains its mobility; but it afterwards is slow and the pupil dilated. Deep in the bottom of the eye, a concave pale grey, or yellowish green, or reddish, variegated opacity is observed. The further the disease advances, the paler the bottom of the eye becomes, the paleness extending to the iris, until at last a slender vascular plexus—the ordinary ramification of the central artery and vein—may be discerned. With this state of the eye, decline or total abolition of vision is the consequence. This rare form of amaurosis seems to consist of a deficiency of the pigmentum nigrum, and of the tapetum of the uvea. It appears closely allied to far advanced glaucoma. This form of the disease is seldom or ever benefited by medical treatment.

62. V. DIAGNOSIS.—Amaurosis is liable to be mistaken for incipient cataract, and for glaucoma. When cataract is fully developed, the two diseases can scarcely be confounded. That a clear diagnosis should be made between incipient cataract and amaurosis is of the greatest importance in practice. (A) As to the impaired vision in both diseases at their commencement, it may be remarked that in cataract, the difficulty of sight increases very slowly, and is compared to a diffused mist, thin cloud, or gauze intervening between the eye and the object: whereas in amaurosis, the dimness or loss of sight is either sudden or partial, resembling a fly, spots, or motes covering parts of an object. However, a mist, or thin cloud, often is complained of in incipient amaurosis, and, increasing in density, at last deprives the patient of sight; but a complete deprivation of sight never occurs in cataract. As incipient cataract depends upon commencing opacity, generally at the centre of the lens, the appearance of a mist, &c., is generally most perceived when the patient looks straight forward; vision being more distinct when he looks sideways. This commonly does not obtain in amaurosis, although it sometimes does.

63. (B) The degree of light which the patient desires is also important. When amaurosis depends upon insensibility of the retina, there is a great desire of strong light, and he sees the best at noonday, or when objects are brilliantly illuminated. The opposite of this obtains in cataract; for a strong light, causing the pupil to contract, the rays of light reflected from the object must pass chiefly through the central and more opaque part of the lens. In addition to this we should attend to the antecedent and attendant symptoms of amaurosis; especially vertigo, headache, disorder of the digestive organs, without which cataract usually commences.

64. (C) Upon examining the pupil, incipient amaurosis presents either the jet-black colour of

health,—excepting in the cat's-eye amaurosis of BEER, which is of rare occurrence, and presented to us under circumstances not to be mistaken,—or a paleness or greenness, visible only when the eye is examined in particular directions, constituting amaurosis with *glaucoma*. This appearance evidently arises from deficiency of the pigmentum nigrum, and incipient dissolution of the hyaloid membrane; and when it amounts to a high degree, constitutes the cat's-eye amaurosis of BEER.

65. Mr. MACKENZIE remarks on this subject, that attention to the following circumstances will generally enable the observer to distinguish glaucomatous amaurosis and cataract:—1st, The opacity in glaucoma is always greenish, whereas in incipient cataract it is always greyish. 2d, The opacity in glaucoma appears seated at a considerable distance behind the pupil, or deep in the vitreous humour; whereas in lenticular cataract, the opacity is close behind the pupil. In posterior capsular cataract, the opacity is deep in the eye, but is always streaked; whereas the glaucomatous reflection is always uniform, never spotted, nor radiated. 3d, Upon close examination of the surface of lenticular opacity by means of a double convex lens, it is seen slightly rough, somewhat dull, never smooth or polished—forming, in these respects, a striking contrast to the appearances presented by glaucomatous opacity. 4th, The eyeball, in glaucomatous amaurosis, always feels firmer than natural; while in cataract it presents the usual degree of firmness. 5th, Glaucoma proceeds very slowly in its course, scarcely increasing for years; whereas the vision, in cataract, much more rapidly declines, and keeps pace with the growing opacity.

66. (D) The mobility of the iris is a principal source of diagnosis. For, in incipient cataract, the contractions of the pupil are as extensive and as vivid as in health; but, in incipient amaurosis, the pupil is either dilated and fixed, or its motions limited and slow. Also, in the latter disease, the movements of the eyeballs and eyelids are often imperfect, or difficult; whereas no impediment of this description exists in cataract. In many cases of amaurosis, we observe a want of direction in the eyes, or a slight degree of strabismus, not infrequently with a want of power over the motions of the upper lid,—symptoms that never occur in cataract.

67. VI. PROGNOSIS.—This is unfavourable. When the cause of the disease is evident, and it is merely functional, or simply congestive or inflammatory, and the patient young, or in the prime of life, but under middle age, a complete cure is not infrequent. This may be obtained although much more rarely, even when the loss of sight is total. But in every case the predisposing and exciting causes, and the effects of remedies, must be taken into account in forming our prognosis. Much more commonly only partial amendment is produced. Amaurosis is generally less unfavourable when suddenly, than when slowly induced. When the pupil is only slightly dilated, still moveable, of its natural form, the eyeball neither firmer nor softer than in health, and no glaucoma present, the prognosis is obviously more favourable than when the pupil is fixed in the states either of expansion or contraction, or when the eyeball is either boggy or preternaturally hard, or when the bottom of the eye presents a greenish opacity.

68. If the attack has been sudden, and nearly complete, or if objects are seen in a perverted or distorted form or double; if the amaurosis be attended with want of power in the muscles of the eyeball or eyelids, we should suspect that the cause consists of general or partial pressure, or other organic disease, within the cranium, which, although indicating both danger and the permanent loss of sight, may sometimes be removed by energetic treatment. If one amaurotic and paralytic symptom slowly supervene on another, we should dread the gradual development of tumours, cysts, exostosis, &c. within the head, the situation and nature of which can be suspected only, and chiefly from the nature of the attendant or preceding symptoms. But in all these the prognosis is necessarily very unfavourable.

69. VII. TREATMENT. — In order to employ remedies in this affection with any degree of benefit, it will be necessary to direct them with a very particular reference to the pathological conditions of the eyes, the brain, and system generally, as now pointed out. Having separated the disease into the foregoing species or varieties, in order that the treatment may be pointed out with greater precision, I proceed to detail the measures which I consider appropriate to each, conformably to the most experienced authors, and to my own observation.

70. A. *Of the first species.* The treatment of this, the most strictly functional form of the disease, should have strict reference to the causes which induced it, — whether those acting directly on the organ, or those which act indirectly, and in consequence of inducing disorder of other parts. When amaurosis proceeds from direct causes, either of a depressing or an exhausting nature, the appearance of the eye, as well as the character of the symptoms, require an attentive examination, chiefly with a view to ascertain the existence of inflammatory action, or even active congestion of the internal parts. A complete removal of the causes must be insisted on; and, if no symptoms indicative of inflammation (§ 46.) exist, but, on the contrary, debility, a languid circulation, *musæ volitantes*, or dark spectra, &c. (§ 39.), tonics and stimulants, both internally and externally, are required. A light, nutritious, and invigorating diet, with change of air, repose of the organs, moderate exercise, vegetable, and afterwards mineral tonics, and the usual means of improving the digestive organs, and promoting the functions of the bowels and secreting viscera, are in these cases chiefly to be depended on. Small doses of *strychnine*, or of the extract of *nuxvomica*, may also be given (FORM. 541. 565.).

When, however, we find evidence of congestion or increased vascular action of the internal parts of the eye to have been induced, the means to be employed in the next species must be resorted to.

71. When this species of amaurosis proceeds from interruption or disorder of the digestive functions, as indicated by the symptoms of such disorder, by a foul tongue, acidity and flatulence of stomach, and torpid bowels (§ 39.), *emetics*, as recommended by RICHTER, OTTO, SCHMUCKER, FLEMING, SCARPA, and MACKENZIE, may be exhibited; but, unless the symptoms of interrupted digestion, or of indigestible and injurious substances remaining upon the stomach, or of biliary obstruction, be unequivocally present, little ad-

vantage will be derived from them: in plethoric persons, or where these causes of disorder do not exist, they may be even injurious. Amaurosis from disorder of the digestive organ is generally imperfect, and sometimes slight, and its progress slow. In this form, SCARPA recommends *full vomiting* to be produced by the patient taking a spoonful, every half hour, of a solution of three grains of tartar emetic in four ounces of water; and, on the following day, opening powders to be commenced with, consisting of an ounce of superhydrate of potash and one grain of tartarized antimony, divided into six equal parts. The patient is to take one of these parts in the morning, another four hours afterwards, and a third in the evening, for eight or ten successive days. The effects of these are, nausea, and increased evacuations from the bowels; and, in the course of a few days, vomiting. If, during their use, the patient should complain of a bitter taste in the mouth, vain efforts at vomiting, and no improvement of sight, the emetic, as at first directed, is to be again taken; and this is to be repeated a third or fourth time, if the bitter taste, acid eructations, nausea, &c. continue. The repetition will often at last succeed in procuring the discharge of a yellowish or greenish matter from the stomach, to the relief of the head and eyes.

72. The stomach, and through it the liver, having been thus acted upon, the following resolvent pills of SCHMUCKER are to be taken, to the extent of fifteen grains, night and morning:

No. 11. R Gum. Sagapen, Gum. Galbani, Sap. Venet. aa 3j; Rhei 3jss; Antimonii Tartarizati gr. xv; Succ. Liqueur 3j. Divide in Pilul. gr. liij.

These pills are to be continued for four or six weeks. Instead of these, the pills recommended by RICHTER may be prescribed.

No. 12. R Gum. Ammoniaci, Gum. Asafoetidi, Sap. Venet, Rad. Valerian., Summit. Arnicæ, aa 3j; Antimonii Tartar. gr. xvij; Syrup. q. s. M. et divide in Pilulas gr. liij.

From twenty to thirty grains are to be taken three times a day for some weeks.

73. If these succeed in improving the state of the stomach and sight, SCARPA directs means calculated to strengthen the digestive organs, and nervous system: such as the daily exhibition of bark and valerian, more particularly in periodic amaurosis; a light, digestible animal diet, with a moderate quantity of wine, and wholesome air and exercise. He further prescribes, as advised by THULENIUS and MORICCA, the vapour of liquor ammoniac created to the eye, with the view of exciting the nerves of the organ; and employed, three or four times a day, so as to occasion each time a copious secretion of tears. In conjunction with the use of this vapour, other external stimulants, as blisters to the nape of the neck, behind the ears, or to the temples; irritation of the nerves of the nostrils by sternutative powders; and, lastly, sparks of electricity may be resorted to. Various volatile substances, spirituous, saline, and oleaginous, have been recommended to be applied to the eyes, either in a state of vapour, or of solution and dropped into them, by WARNER, SAGAR, MANARDUS, DUNKLER, CHOMEL, St. YVES, and SCHMUCKER; but these require to be cautiously resorted to. Substances of a like description have also been prescribed in the form of *collyria*, in this species of amaurosis. FLECK recommends for this purpose a drachm of the *croci metal-*

lorum dissolved in rose water; or a portion of the following:—

No. 13. R. Spirit. Lillior. Conval. Spir. Lavand. / Spir. Rorismar. Muriatis Ammon. aa ʒj; Spir. Bala. Vftm Hoffman. ʒss. M.

to be poured in the palm of the hand, and held before the eyes. The application of cold and slightly stimulating washes and baths to the eye, and bathing the whole head, or eyes, in cold water, have been approved by RICHTER and BEER. Mr. TRAVERS, however, states, that he has never obtained any decided advantage, in amaurosis, from applications made directly to the eyes. Both electricity and galvanism have received the recommendation of WARE, LENTIN (*Beiträge*, iv. b. p. 102.), and OSSIANDER (*Abhandl. Med. Soc. zu Erlang.*, i. b. No. 8.). Moxas applied in the course of the facial nerves have been used by LARNEY; and the actual cautery behind the ears by KHILODOVITCH. (*Archives Génér. de Méd.*, t. xvi. p. 452.)

74. In this species of amaurosis, both in cases of the above description as well in those which proceed from the over exertion of the sight, the external application of strychnine promises to be of considerable advantage. Mr. LISTON, Dr. SHORT (*Lond. Med. Gaz.*, vol. v. p. 541.), and Dr. HEATHCOTE (*Medico-Chirurgical Rev.*, July 1836.), have thus employed it with decided benefit. After blistering the temples, and removing the cuticle, from one eighth to one fourth of a grain of pure strychnine was applied to the denuded surface of each side daily, and the application renewed each day, and gradually increased to a grain. In one case the quantity was increased to three grains, but it is seldom requisite, and it may sometimes not be safe, to exceed half this quantity. In some cases it will be necessary to re-blister, oftener than once, the surface, after repeated applications of the strychnine. Cataplasms of *capsicum* have also been employed with advantage to the temples. GAIM mentions them with approbation; and I have seen them used in amaurosis with decided benefit by the native doctors in warm climates. HOFFMANN and TREW employed the cajuput oil in this manner, and WANNER the animal oil of Dippel.

75. Mr. TRAVERS and Mr. LAWRENCE are not advocates for the use of emetics. The former prefers to remove the gastric disorder by a course of blue pill, with gentle saline aperients and vegetable tonics. He recommends the combination of blue pill with colocynth, rhubarb, and aloes; and of soda with columba, gentian, or rhubarb; with the view of promoting or regulating the abdominal functions. After these he advises the use of general tonics, as the mineral acids, bark, steel, and arsenic. Mr. LAWRENCE chiefly approves of attention to the general health, by residence in a pure air; out-of-door exercise; mild, plain, but nutritious food; gentle aperients, and occasionally an active purgative; repose of the affected organ; counter-irritation by a succession of blisters, an open blister, or setons. BEER is also against the use of emetics. He prefers the employment of brisk cathartics; followed by the use of anthelmintics, when we suspect the presence of worms in the bowels. Rubefacients, stimulants, and blisters to the temples and eyebrows, are favourably mentioned by him.

76. There can be no doubt of the propriety of the measures recommended by the above writers:

but are we to remain content with them alone, in cases where amendment from them is either slow or not apparent? I think not; and therefore are we required to devise additional means. Those already recommended by the eminent Continental authorities, as stated above (§71, 72.), and the external medication already described (§73, 74.), have both authority and reason in their favour, if duly followed. But it may be useful to suggest others. For, in cases of this disease, the practitioner will have reason oftener to regret the want, than to be perplexed by a diversity, of rational resources.

77. After having had recourse to evacuations, to emetics with great caution, and under the circumstances stated above (§71.), always to aperients, alteratives, and occasionally to brisk purgatives, promoted by enemata, suited to the peculiarities of the case, and repeated as long as the secretions are impeded, and the evacuations offensive, or of an unhealthy colour, other internal means must be sought for, if necessary. Amongst these, in this species of the disease, camphor, combined with *arnica*, and in considerable doses, has been recommended by FLEMING (*Hufeland's Journ.*, &c., Jan. 1810, and May 1812.); the *rhus toxicodendron*, or the *rhus radicans*, in the form of tincture, by BASSE and HUFELAND (*Jour. der Pract. Heilk.*, &c., Jan. 1811.); and phosphorus, by LOEBEL (*Horn's Archiv.*, Nov. 1812, p. 397.). Musk, castor, assafoetida, valerian, and zinc, have also been favourably noticed by BEER.

78. It is chiefly in this form of the disease that advantage, if any, will be derived from the use of *aconitum*, which, however, has received the approbation of BOEHMER, COLLIN, STOELLER, REINHOLD, GRESNER, and other respectable authorities, particularly when the affection is connected with chronic rheumatism, or atonic gout, or occurs in the gouty and rheumatic diatheses. *Guaiaecum* has been recommended by WINTINGHAM; and, under the circumstances of disease now alluded to, particularly when combined with camphor and ammonia, and given after due alvine evacuations have been procured, is calculated to prove beneficial. The *arnica montana*, which has been prescribed by BALDINGER, COLLIN, FRANCE, THULENIUS, and ANGELL, is applicable to this form of amaurosis only. It is most probably from having employed it in very different states of the disease, — in the inflammatory, or those depending upon organic change within the head, — that it has been disapproved of by RICHTER and SCHMUCKER.

79. The chief complications of functional amaurosis require no very different treatment to that which has been described. The not infrequent association of the disease with worms demands the use of anthelmintics, followed by purgatives, and the administration of vermifuge enemata, &c. (see Art. Worms.), and afterwards by vegetable or mineral tonics. But, in the majority of cases of even functional amaurosis, the use of the preparations of iron requires caution. When the disease is occasioned by lead, or accompanied with the *lead colic*, or attended by paralysis of any other parts of the body, the exhibition of calomel, with camphor and small doses of opium, followed by purgatives, and antispasmodic and aperient enemata, is extremely serviceable. After the secretions and functions of the abdominal viscera are restored by these means, strychnine, or the

extract of *nux vomica*, may be prescribed both internally and topically. (FORM. 542. 565.) The connection of the disease with hysteria, hypochondriasis, obstructions of any of the abdominal secretions, chiefly requires the combination of antispasmodics with aperients; chlorine, iodine, or sulphureous baths; the occasional exhibition of a brisk purgative; and, afterwards, the warm salt water bath, tonics with stimulants, and strict attention to the secretions and functions of the digestive organs, and to diet, air, and exercise. After all obstruction is removed, cold bathing, or chalybeate or salt water baths, followed by frictions of the cutaneous surface, may be used.

80. *B. Of the second species.* When amaurosis is attended with those symptoms which I have described as marking active congestion of the internal parts of the eye, or of the head or thoracic viscera (§ 41.), a very different treatment to that enjoined above is requisite. In the first species of amaurosis, bloodletting is generally prejudicial—it has even caused the disease: but in the congestive species, bloodletting, either general or local, or both, according to the circumstances of the case, is indispensable. In every form of the disease the means of cure must be regulated by the apparent vascularity of the eye, the plethoric state of the countenance and body, and by the state of the arterial pulse, examined not only at the wrists, but also in the carotids and temples.

After depletion, to an extent which the well-informed practitioner will be led to adopt according to the particular characters of the case, the promotion of the alvine discharges, and of the cutaneous and alvine secretions, will next require his attention, as salutary modes of derivation and evacuation; and afterwards the application of blisters, setons, issues, and other counter-irritants, behind the ears, or to the nape of the neck, will generally be necessary to complete, or to render permanent, the cure. The tartarized antimonial ointment, moxas, the mezereum issue, the actual cautery to the nape of the neck, or to the occiput, and errhines, have severally been recommended by eminent Continental writers in this state of the disease.

81. The shower bath, sponging the head with cold water night and morning, the cold douche, or the effusion of a stream of cold water on the head, are means which ought not to be neglected in those cases in which the congestion is of an active character, or approaches to the inflammatory state. When this form of the disease is consecutive of interrupted or suppressed discharges or evacuations, the restoration of these must be attempted. If the menses be suppressed, leeches to the pudenda, or the insides of the tops of the thighs; or bleeding from the feet; the preparations of iodine, aloetic purgatives, and other emmenagogues; stimulating pediluvia, and the hip bath, with the other means usually resorted to in cases of amenorrhœa, are to be employed. If it proceed from suppressed hæmorrhoids, leeches may be applied to the vicinity of the anus, and purgatives, with calomel, colocynth, and aloes, prescribed. If it supervene on the disappearance of gout or rheumatism, sinapisms and irritating cataplasms may be directed to the extremities, and free alvine evacuations procured; after which colicium, combined with alkalies or magnesia,

and, in some cases, with ammonia or camphor, may be exhibited, or aconitum combined with antimonials, and purified sulphur; and rubefacients applied behind the ears, or to the temples. When it appears after the suppression of eruptions, and healing of old ulcers, the use of the tartar emetic ointment, setons, and perpetual blisters behind the ears, are particularly indicated. If it follows a suppressed cold, WELLER recommends weak sternutatories, with calomel or hellebore.

82. Mr. TRAVERS has very justly remarked, that a loss of balance of the circulation, producing undue determination of blood to the head, often exists independently of general plethora, and is aggravated by sanguineous depletion. It is sometimes even met with in corpulent persons; and is not infrequent after over-excitement and chronic inflammation. Instead of requiring loss of blood for its removal, this state of the disease demands an equalization of the circulation, by promoting the various secretions, and the derivation of the excessive supply to other parts by the means now stated, assisted by an abstemious and regular diet, gentle exercise in the open air, the promotion of the functions of the liver and bowels, and the means usually employed to benefit the general health. Even in some of these cases, the local means noticed above, as the vapours of ammonia, &c. (§ 73.), may be serviceable in restoring the tone of the vessels of the eyes.

83. *C. Of the third species.* Inflammation of the internal parts of the eye, particularly of the retina, requires decision, in the more intense cases, and a vigorous but judicious application of the usual antiphlogistic remedies. In the slighter cases, the exact nature of the disease may be mistaken for either of the foregoing species. Slight or slow inflammatory action may exist without any material affection of the pulse, or pain of the organ; but the appearance of the blood-vessels of the sclerotic, and the state of the iris, will often indicate its presence when other signs are wanting. When the attack is acute, both general and local depletions are required. In these cases PIENCK has advised the performance of arteriotomy; SPIGELIUS and HOFFMANN, of blood-letting from the frontal vein; and SAUVAGE, from the jugulars. But vascular depletion is not to be relied upon alone. Active evacuations from the bowels, determination to the skin by small and repeated doses of antimonials, and the use of the tartar emetic blister or plaster, behind the ears, or to the nape of the neck, are to be also adopted.

84. If these means fail of producing a very decided improvement in a very short time, we must endeavour to affect the mouth slightly with mercury, without producing salivation. In order that this may be done with rapidity, and with as little mercury as possible, the preparations of this mineral to be employed will be advantageously combined with James's powder, or antimonial powder, and small doses of camphor. The treatment is, in such cases, similar to that usually resorted to in iritis. Much of the advantages to be procured from the use of mercury in this form of amaurosis, as well as in iritis, depends upon the promptitude with which it is employed. In this, TRAVERS, LAWRENCE, MACKENZIE, and others agree. Indeed, the use of calomel, and other

preparations of mercury, either alone, or combined with other substances, has been adopted in the inflammatory states of amaurosis, from the time of HEISTER and BOERHAAVE. BANG, HUPMANN, SCHMUCKER, ZUICKEN, and BREITING, agree in recommending them. BOETTGER advises the combination of calomel with belladonna; and HEY, calomel with camphor: both being judicious modes of combining this medicine. MEAD, STAHL, HOFFMANN, and ISENFLAMM, advise the production of salivation; but I agree with TRAVERS in considering the affection of the mouth as sufficient. The use of mercury is much praised by BEER in such cases, as well as in those of a syphilitic origin, or which are complicated with engorgement of any of the abdominal viscera. Care should be had not to employ it in debilitated or scorbutic persons, and when the eye is soft or boggy. Many of the Continental writers, and Mr. WARR, prefer the sublimate to other preparations. It is best exhibited, as recommended by VAN SWIETEN, dissolved in brandy, and taken in a basin of sago or gruel. It may be continued for six weeks, or even longer.

85. The success which has resulted from the exhibition of the *oleum terebinthinæ* in iritis induced me to prescribe it, after depletions, in two cases of this form of amaurosis; and with satisfactory results in both. In persons far advanced in life, in scrofulous subjects, and in debilitated persons, this oil is certainly a less hazardous medicine than the mercury exhibited so as to affect the system.

86. In the slighter or more chronic inflammatory forms of amaurosis, particularly when met with in the description of subjects just now alluded to, much circumspection is necessary in the use of depletions: general bloodletting is here inadmissible, particularly when this class of patients are ill fed, and live in close and ill ventilated streets and apartments in large towns, and local depletions only are indicated. In cases of this description, and under these circumstances, the *oleum terebinthinæ* will prove a valuable medicine; and even, although we may deplete thus locally, the internal exhibition of tonics, with a nutritious diet, attention to the alvine secretions and evacuations, and a wholesome air, will prove the most beneficial remedies.

87. This form of amaurosis, as well as the preceding, will occasionally supervene from suppressed evacuations and eruptions, and more rarely from misplaced gout and rheumatism. (§ 48.) In such cases, the treatment already recommended, as appropriate to each of these (§ 81.), will be equally applicable here.

87. Besides the above means, it has been recommended by BROMFELD, to insert an issue in the scalp; by HOFFMANN, to apply leeches to the insides of the nostrils; by numerous authors, to employ errhines and sternutatives, with the view of provoking a copious secretion from the Schneiderian membrane; and by as many others, to use the actual or potential caustery, setons, moxas, &c. to the nape of the neck, or to the occiput. Leeches and counter-irritants are safe, and sometimes useful, remedies in this and the preceding species; but errhines and sternutatives may be hurtful, unless the affection has arisen from suppressed discharges from the nostrils. They are most serviceable in the functional state of the

disease. The safest that can be employed in this species of amaurosis is the one recommended by the late Mr. WARE. It consists of ten grains of the hydrargyrus sulphuratus, well mixed with a drachm of common sugar: a small pinch of it generally produces a copious discharge of mucus from the nose.

89. *D. Of the fourth, and remaining species.* When we have reason to suspect that the amaurosis depends upon advanced organic lesion of the internal parts of the organ consequent upon inflammation, we should still bear in mind that, with the supervention of such lesion, whatever it may be, the inflammatory action seldom altogether subsides, but continues, more or less, in a chronic, atonic, or disorganizing form. Therefore the propriety of still having recourse to local depletions, particularly if these have been neglected early in the disease, to purgatives, derivatives, or revulsants: the cold douche to the head; and, afterwards, to the use of stimulating vapours, when we have reason to suspect that the change continues rather in consequence of lost tone of the vessels, and inaction of the absorbents, than from increased action. Under such circumstances, the vapour of camphor and acetic acid, or of the liquor ammoniac, may be tried.

90. *a.* If the amaurosis have arisen from external injury of the ball of the eye, or concussion of the organ (§ 51.), the chief indication is to prevent, or to repress, increased vascular action, by the means already recommended; to attend to diet and regimen, and to keep the organ in a quiet inactive state for some time; after which, if the affection still continue, the treatment must be directed according to the particular lesion, functional or organic, that may have been primarily or consecutively produced.

91. *b.* When the history of the case leads us to suspect the dependence of this affection upon disease within the head (§ 52.), or tumours pressing upon the optic nerve, &c. (§ 56.), the treatment must necessarily be directed, according as the symptoms referrible chiefly to the head may lead us to infer the nature of the primary lesion. If such symptoms, particularly the temperature of the head, and the action of the carotids, indicate the existence of congestion, interrupted circulation, or increased action, the treatment must be accordingly. But under almost every circumstance, counter-irritation, and external as well as internal revulsants, will prove safe, and sometimes serviceable, means of cure.

92. If we have reason to suspect the formation of tumours; thickening, or other change, of the membranes or of the bones, particularly as a consequence of syphilis; and extravasations of blood, or of serum, within the cranium, or in the course of the optic nerves, &c. (§ 52.), the internal use of the preparations of iodine, and particularly of the *hydrodate of mercury* or of *potash* (see FORM. 323, 324.), should not be overlooked. I have employed these preparations with much benefit in three cases of amaurosis connected with paralysis; two of them consequent upon apoplectic seizures. In the intervals between the courses of iodine, deobstruents, and alterative doses of blue pill, with the extracts of sarsaparilla and taraxacum, or with the decoction or other preparations of sarsaparilla, should be prescribed.

93. c. When the affection seems connected with lesion of the other nerves subservient to vision (§57.), the treatment must necessarily depend upon the seat and nature of this lesion, and, in some rarer cases, upon the state of the associated derangement. If it be connected with neuralgia of the nerves of the face, disorder or irritation of these nerves may exist at their origin, or in their course through the membranes and bones of the cranium. The cause may also be external—in a diseased tooth or stump, or a partially separated external branch of the ophthalmic trunk of the fifth nerve. In all such cases, as well as in the other forms, states, and associations, of the fifth, sixth, seventh, and eighth species, which have been enumerated, the treatment must vary in each, and be directed according to the very numerous pathological conditions, which the well-informed pathologist will detect, either as their efficient causes, or as their relaxed effects.

94. Throughout the treatment of this disease, the practitioner should keep the following facts in recollection:—1st, An appropriate, and hence successful, method of cure should have an intimate relation to both the remote and proximate causes of the disease, and the natural or morbid diathesis of the patient: 2d, It must be directed after a minute inspection of the eyes, and examination into symptoms connected with the head and the digestive viscera: 3d, It must be modified according to the nature of its related, associated, and symptomatic disorders: and, 4th, That much of the success will often depend upon the strict regulation of the patient's digestive and organic functions; upon diet and regimen; and upon a regulated exercise both of the organ of sight and of the body, with a pure and temperate air. Keeping these indications in recollection, the practitioner will modify and adapt the treatment to the presumed nature, seat, complication, and relations of the disease.

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AMENORRHEEA. See MENSTRUATION.

AMNIOS. See DROPSY OF THE AMNION.

ANÆMIA. See BLOOD, Deficiency of.

ANÆSTHESIA. See SENSATIONS, Morbid States of.

ANASARCA. See DROPSY OF THE CELLULAR MEMBRANE.

ANEURISM. See AORTA, Aneurism of; and ARTERIES, Morbid Structures of.

ANGINA. See CROUP, FAUCES, Inflammations of. LARYNX, Inflammations of. PHARYNX, Inflammations of. THROAT, Inflammations of.

ANGINA PECTORIS. SYN. *Cardiognus Cordis Sinistri*, Sauvages. *Angina Pectoris*, Heberden. *Asthma Arthriticum*, Schmidt. *Diaphragmatic Gout*, Burton. *Asthma Dolorificum*, Darwin. & *Syncope Anginosa*, Parry. *Angor Pectoris*, J. Frank. *Asthma Convulsivum*, Elsner. *Pnigophobia*, Swediaur. *Sternodynia Syncopalis*, Sluis. *Asthenia Pectoralis*, Young. *Stenocardia*, Brera. *Asthma Spastico-Arthriticum*, Stoeller. *Sternalgia*, Baumes and Good. *L'Angine de Poitrine*, Fr. Brustbräune, Hersklemme, Brustklemme, Ger. Angina di Petto, Ital. Suffocative Breastpang, Eng.

CLASSIF. 2. Class, Diseases of the Respiratory Function; 2. Order, Affecting the Lungs, their Membranes, or motive Power (Good). II. CLASS, I. ORDER (Author, see Preface).

1. DEFIN. *Acute constrictory pain at the lower part of the sternum, inclining to the left side, and extending to the arm, accompanied with great anxiety, difficulty of breathing, tendency to syncope, and feeling of approaching dissolution.*

2. This affection was not recognised as a distinct disease by medical authors, until Dr. HALLER described it as such in the Medical Transactions of the London College of Physicians (vols. ii. and iii.); but the works of MORGAGNI and HOFFMANN show that they were not unacquainted with it in practice. It was also noticed by POTER (*Opera*, No. 22. p. 302.), under the head "Respirandi difficultas, quæ per intervalla deambulantibus incidit;" and he remarks respecting it, that the attacks were sometimes so severe that persons had been suddenly carried off by them. Obscure notices of affections, which probably were of this nature in some instances, may also be detected in authors from HIPPOCRATES downwards. From amongst these, the reader may refer to ARETÆUS (*Opera*, p. 7. Oxon. 1723.), CÆLIUS AURELIANUS (lib. ii. c. i. p. 348.), BARTELETTI (*Methodus in Dyspnœam*, Bon. 1632.), and others, addressed by ZECHNELLI (*Sull' Angina di Petto*, Pad. 1813.), who supposes that the case of SERENA (*Opera*, t. ii. p. 136.), which he has himself described by the term *aspirium*, was actually this malady. Dr. CULLEN has passed Angina Pectoris over in his work; but it has been well described by Drs. FOTHERGILL, WALL, DUNCAN, BUTLER, PERCIVAL, DARWIN, MACBRIDE, HAMILTON, MACQUEEN, JORNSTONE, HAYGARTH, PARRY, NICHOLL, and GOOD, in this country; and by JURINE, BRERA, LENTIN, DESPORTES, KREYBIG, RITTER, ZECHNELLI, and STÖELLER, on the Continent; and by Dr. CHAPMAN in America.

3. PATHOLOGY.—I. SYMPTOMS. An attack of this disease is often preceded by considerable derangement of the digestive organs, especially by flatulence, acid or acrid eructations, or other symptoms of indigestion, with torpid bowels, pains in the limbs, and occasional spasms about the chest: but it frequently also attacks a patient, particularly when walking or ascending an eminence, without any, or with but slight, premonition.

ANGINA PECTORIS—CAUSES.

4. *A.* In its *acute form*, the patient is seized with a sense of painful constriction of the chest, particularly at the cardiac region, about the lower part of the sternum, inclining to the left, and extending to the left, occasionally also to the right, arm—at first, no further than the insertion of the deltoid muscle; but the pain often successively reaches to the elbows, wrists, and sometimes even to the fingers. This is the mildest form of the disease, and soon subsides with the disappearance of its exciting cause.

5. In the more violent form of the attack, the pain and sense of constriction in the chest, and pain in the left arm, which also frequently extends to the right, amount to excruciating agony; being likened, by LAENNEC, to the piercing of nails or the laceration by the claws of animals. This feeling is accompanied by a sense of syncope or suffocation, sometimes with suffocative orthopnea, convulsive dyspnoea, and palpitations; always with extreme anxiety, and a sense of approaching dissolution. The suffocative sensation is characterised by concomitant tightness and fullness of the chest, and flatulent distension of the stomach, and irritative feeling in this organ, which is relieved by eructations. During this period the pulse is variously affected, sometimes little changed, at other times extremely weak, irregular, or intermittent; and occasionally it is full, active and bounding. If the attack has been induced by walking or exercise, the patient suddenly stands still, from a feeling that perseverance in either would produce a total suspension of living power. In the slighter attacks, or early in the disease, rest merely will often immediately remove it; but this is seldom the case in the protracted and severe forms in which it frequently occurs.

6. The paroxysm continues from a few minutes to one or more hours, according to the severity and the duration of the disease. When the malady has assumed a chronic form, and its attacks occur during the night, or when the patient is at rest, the paroxysm is less violent, but generally of much longer duration; whereas, when it is induced by exertion, &c. it is of extreme violence, but of short continuance: the average duration of the fit may be about half an hour. Upon its cessation the patient merely retains a slight feeling of the various symptoms, with numbness of the arms, particularly the left. When the disease is of short standing, the paroxysms occur at long intervals, which are gradually shortened, until there is but little exemption from them, and the affection assumes a less acute character.

7. *B.* The *chronic form* of the disease is characterised by the circumstance of its being frequently a consequence of the acute; by the occurrence of the fit from the slightest causes, and after short or imperfect intervals of exemption; by its recurrence when the patient is at rest, or asleep; and by its much longer duration, but less extreme violence. Even if this form be induced by exercise, rest has little influence in shortening its duration, as in the preceding; and the paroxysm has been protracted not only for some hours, but even for several days. Palpitation of the heart, irregular and intermitting pulse, are more frequently concomitants of this state of the disease, than of the other. In the case of a very eminent and learned member of the profession, whom I

long attended in this form of the disease, the attack has often continued as now described, with little remission for several weeks. Sometimes the irregularity of the pulse is observed only during the paroxysm; but in some cases it is continued, as Dr. FOTHERGILL has correctly remarked, during the intervals, particularly when they are marked by imperfect relief.

8. This form of the disease may also occur primarily. It has twice presented itself to me in this manner. During the severity of the attack, leipothymia, a feeling of dissolution from the intense agony, and these followed by palpitations, and an irregular state of the pulse, generally occur. In some cases the agonizing pain extends not only to the arm or arms, but ascends also up the throat and lower jaw, accompanied with a severe sensation of spastic constriction. In the majority of cases the above sensations are only present, when excited by motion, by assuming suddenly the erect posture, or even by attempting to read; a neuralgic kind of pain generally, however, being felt under the sternum, and extending to the arms; but in some cases, and in two which occurred to me, the exacerbations were often referable to no very evident cause, they sometimes occurring during the night, although the above causes generally induced them.

9. Notwithstanding the remarkable distress characterising the paroxysm, this disease, particularly in its acute state, sometimes does not early affect the constitution, or entail any permanent lesion; the patient often enjoying tolerable health in the intermissions, and performing all his functions naturally, and without embarrassment, until shortly before an attack. After its protracted continuance, however, the vital energies of the frame, particularly as they are manifested in the digestive and circulating organs, give way. Marked disorder of the chylopoietic viscera, attended with various dyspeptic symptoms, occasionally with great irritability of the stomach and bowels, impeded respiration, anxious and pale countenance; flabby state of the integuments and muscles; marked derangement of the circulation, oedema, dropsy, &c.; at last supervene. But it more generally happens that the patient is carried suddenly off by a paroxysm before this state of the system is occasioned; or he sinks under the complicated derangement proceeding from an attack, and from some one of the organic changes which the contiguance and repeated fits of the disease had induced.

10. *II. CAUSES.*—1. *Predisposing.* This disease usually attacks the middle aged, and those beyond it; and men much more frequently than women. Of nearly one hundred cases, about seventy were upwards of fifty years of age; and seventy-nine out of the number were males; nearly one half terminated fatally, and almost the whole of them suddenly. It has been said also to occur more commonly in robust and corpulent persons with short necks. But JÜRINE and CHAPMAN dispute this. My own experience agrees with theirs in respect of its being equally common in persons of a spare as of a full habit. It is most prevalent in those obgouty and rheumatic diathesis, and who lead an indolent, or studious and sedentary life, or who have been subjected to much and continued anxiety and distress of mind, or indulged in much food, and spirituous or other

liquors. JURINE and PARR state that they have scarcely met with it under fifty years of age. The most violent and distinctly marked case of it which ever came before me, occurred in a gentleman at the age of thirty-four. During 1821, I attended an unmarried lady, aged twenty-six, who laboured under it in a slighter form; and recently, in 1830, another single female, at the age of twenty-five, came under my care, with the disease in its most violent grade. In both these females, it seemed perfectly unconnected with uterine disturbance, menstruation being regular, and no tendency to hysteria having at any time evinced itself, or could be detected, my attention having been directed to this point. They both ultimately recovered after a long treatment, and the employment of very decided measures. Nearly all the cases which have come under my observation were more or less referable to mental causes, particularly to disappointment, anxiety, and other depressing passions. Dr. HAMILTON conceives that there is an hereditary disposition to the affection. If we consider it to be of gouty origin, as contended for by BUTLER, MACQUEEN, RITTER, STÖELLER, THILENIUS, ELSNER, and CHAPMAN, an hereditary disposition may be also conceded. But, although very satisfactory proofs have been adduced by these authors, and particularly by Dr. CHAPMAN, in an able paper he has recently published on this disease (*American Journ. of Med. Sciences*, No. xiii. p. 67.), yet it does not seem always to depend upon gout. Of the four cases which occurred to Dr. BLACK, of Newry, one only was subject to gout (*Med. Chir. Trans.* vol. vii.).

11. 2d, *The disease is usually excited by walking*, especially walking against the wind, or up hill; by ascending a flight of stairs, or any acclivity, particularly when the stomach is full or distended by flatus. It is also readily induced by either the exciting or the depressing passions, and by whatever perturbs the mind, or occasions emotion. It may also be induced by the most trifling causes, in some susceptible and irritable habits, as by gentle walking, coughing, speaking, or reading aloud; by suddenly assuming the erect posture; by straining at stool; or even by a meal, however moderate, &c. It may also occur in a state of absolute repose, particularly when the disease has become chronic; and the patient may be roused from sleep by an attack.

12. I have seen it occasioned by rapid changes of temperature, particularly by a rapid change to great cold; but different persons seem differently affected by extreme states of atmospheric temperature. In some slight cases the fit has been shortened, by the patient struggling to overcome it, by frequently attempting to make a full inspiration; but this has also failed. The patient is incapable of making this attempt in the more severe paroxysms.

13. III. DIAGNOSIS. — Angina pectoris is more liable to be confounded with asthma, than with any other disease. But a close attention to the phenomena attending upon both affections, will readily disclose a very great difference between them. The paroxysms of asthma always come on during the night, or at the close of the day: they are characterised by a heavy dyspnoea, wheezing, and cough; are relieved by expectoration and exposure to fresh air, and subside gra-

dually towards morning. They are not excited in the same way, nor by similar causes, nor marked by the acute and peculiar pain in the sternum and left arm, which is distinctive of angina pectoris. The stethoscope and percussion furnish us with no signs peculiar to the disease under consideration, unless it be complicated, as is sometimes the case, with organic lesion of the heart and lungs, or with effusion of fluid within the cavity of the pleura or pericardium, when they materially assist us in ascertaining the nature of the complication; and they also serve, by enabling us to ascertain other affections of the heart, to distinguish between it and them.

14. IV. PROGNOSIS. — In recent cases, of no very violent character, recovery will frequently take place under judicious management. But when the disease has become inveterate from neglect, or from being associated with, or from having given rise to, organic lesion, and when it has appeared in a decayed constitution, or has been preceded by other diseases of the heart or lungs, an unfavourable result should be apprehended sooner or later to take place: but the period of its occurrence is uncertain; and the event is generally sudden — sometimes like an electric shock; the movements of the heart being instantly arrested. This issue is often occasioned by a full meal, or by exercise or mental emotions; but it also occurs in old or chronic cases, when the patient is at rest, and apparently uninfluenced by any circumstance or occurrence. When it is followed by symptoms of effusion of fluid within the thorax, or oedema of the extremities, a fatal termination is seldom far distant.

15. V. PROXIMATE CAUSE, &c. Notwithstanding the number of examinations which have been made after death from this disease, but little light has been thrown upon it. This is not so much owing to the absence of morbid appearances, as to the extreme diversity of those which have been observed. Like epilepsy, or dyspnoea, it has presented almost every lesion, to which the organs which it affects are liable. Many of these may be viewed as accidental concomitants, or as concurrent causes; and not infrequently as results of the repeated functional disturbance occurring during repeated attacks. In several instances, not the slightest morbid appearance could be detected: but more frequently the heart and the large vessels in its vicinity have presented marks of disease, generally varied in its nature, and opposite as to its characters. The most common of these are ossification of the coronary arteries; ossification of the valves of the heart, or of the arterial trunks; enlargement of some of the cavities of the heart, either with diminished or increased thickness of their parietes; but most frequently with softening, paleness, and tenuity of the muscular structure of the organ; varicose dilatation of the coronary veins (BRERA); depositions of adipose matter, to the extent of impeding its functions; effusions of serum, blood, &c. into the pericardium or cavity of the pleura, &c. (FOTHERGILL, BLACK, &c.) It has justly been remarked, by my friend Dr. UWINS, "that there is scarcely any malformation of the heart, or its blood-vessels, that has not been occasionally found after death, from what would be considered angina pectoris: while, on the other hand, individuals have fallen victims to the affection, fully marked, and the most accu-

rate post mortem examination has not been able to detect the slightest indication of structural derangement." (*Compend. of Theoret. and Pract. Med.*) In some cases, the only morbid appearances observed have been in other, and distant organs, from that which seems to be, if not the chief seat of the disease, at least the organ chiefly affected in its functions by it—the heart and large vessels having been altogether exempt from lesion. These appearances were adhesions of the serous surface of the lungs to adjoining parts; serous effusions into the pleura; thickening of the respiratory mucous surface; dilatation of the bronchi; œdema of the intervascular cellular tissue of the lungs; abscess and tumours in the mediastinum; ossification of the cartilages of the ribs (WICHMANN, JAHN); tubercles, enlargement, scirrhosity, &c. of the liver (PERCIVAL, LATHAM, BRERA, and WALKER); scirrhous of the pylorus, &c.

16. These lesions serve less to throw light on the precise nature of the disease than an attentive examination of the morbid phenomena during the life of the patient, and a calm appreciation of their relations, particularly with respect to the agents tending to diminish, remove, or to exasperate them. This affection has been considered by many authors as spasmodic, "although the part immediately concerned seems not to have been designated or understood." Dr. CHAPMAN remarks, that this hypothesis is rendered probable, by the general complexion of the disease—its causes, symptoms, and cure—and by its analogy to other disorders confessedly of this character.

17. Dr. FOURCILLÉ supposed it to be occasioned by obesity, and particularly by a collection of fat about the heart; he also considered that it was sometimes symptomatic of water in the pericardium or cavity of the thorax. PAURY, JENNER, BURNS, KREYING, BOSLOCK, and some others, have viewed this affection as a species of syncope occasioned by the accumulation of blood in the heart, from an ossification of the coronary arteries. Drs. HOSACK and FORBES conceive that it most frequently arises from a plethoric state of the blood vessels, more especially from a disproportionate accumulation of blood in the heart and large vessels. To the first and second of these opinions it may be objected, that there is no obvious connection between the effect and the cause; for, as the cause is permanent, the effect should be continued, or at least present but little abatement, whereas the intermissions between the paroxysms are often characterised by a return of the healthy functions. It may be further stated, in opposition to this hypothesis, that many fatal cases have occurred in which this particular lesion was not found on dissection. LAENNÉC states that he has examined several subjects who had laboured under this disease, and in none of them did he find the coronary arteries ossified. Besides, cases are recorded by MORGAGNI, SENAC, WATSON, CORVISART, ANDRAL, and others, in which ossification of these vessels were not productive, during life, of the sufferings characterising this disease. Indeed the coronary arteries are often found ossified in old persons, who had not complained during life of any affection of the heart, and who certainly never were attacked by this malady. As to the last of the above opinions, viz. that adopted by Dr.

HOSACK, Dr. CHAPMAN has very justly observed, "that even allowing the fulness and irregularity of the circulation contended for, which I am by no means disposed to do, as uniform concomitants, these I should take to be rather the effects of previous irritation or excitement, than the cause of the disease. Do we not also know, that such a condition of the vessels can exist without inducing angina pectoris? Were fulness and irregularity in the circulation only required for the production of the disease, instead of a rare, would we not have it as a daily occurrence? The fact, moreover, is, that angina pectoris, though oftener, perhaps, attacking the plethoric, is to be met with, as I have before said, in the feeble and attenuated." I may add to this, that the severest case of the disease which has ever occurred to me was that of a gentleman who had suffered severely from repeated and profuse hæmoptysis, and other symptoms of disease of the lungs. All these disappeared, but were followed, after some time, by angina pectoris. He was feeble and attenuated; but it was considered advisable to try the effect of blood-letting to a moderate extent: this gave no relief; it was repeated, but the symptoms were evidently aggravated by the measure.

18. Dr. JERIN considers the disease as a nervous affection; and he supports this opinion by referring to the sudden and unexpected manner of its attack—to its sudden termination in death, or restoration to health—the nature of the exciting causes of the paroxysm—the equality and regularity of the pulse, in the majority of cases, during the paroxysm—to the state of the respiration—to the painful sensation extending to the upper extremities—and lastly, to the circumstance of antispasmodics being beneficial in its treatment. The proximate cause, he adds, consists of an affection of the pulmonary nerves, disturbing the functions of the lungs, impairing the decarbonisation of the blood, and producing the pain in the sternum. This affection of the pulmonary nerves is communicated to the cardiac plexus, and deranges, secondarily, the heart and large vessels. The imperfect decarbonisation of the blood diminishes its stimulating influence on the heart and lungs, giving rise to repeated attacks, until it occasions the death of those organs, and then of the brain.

19. MM. DESPOTES and LAENNÉC have adopted a nearly similar view of the disease, with this difference, that they consider its particular seat may vary according to circumstances. Thus, M. LAENNÉC states, that when there exists, simultaneously, pain in the heart and lungs, we may presume that the affection is seated chiefly in the pneumo-gastric nerves; but where there is simply stricture of the heart, without pulmonary pain or difficulty of breathing, its site is in the nerves which the heart receives from the great sympathetic. But he supposes that other nerves may also be implicated at the same time, either by direct anastomosis or by sympathy; and that the branches of the bronchial plexus, particularly the cubital, are nearly always so affected. "The anterior thoracic originating in the superficial cervical plexus are, moreover, frequently implicated; and this is sometimes further the case with the branches derived from the lumbar and sacral plexuses, when the thigh and leg participate in the attack, which occasionally happens."

20. BRERA, ZECHINELLI, AVERARDI, and some others, consider the disease to be occasioned by pressure of enlarged abdominal viscera on the heart, particularly of enlarged liver. JOSEPH FRANK conceives it to proceed from congestion of the cavities of the heart, occasioned by defective nourishment of its muscular structure; this defective nutrition itself resulting from previous inflammation, or from metastasis of gout or rheumatism, or from disease of the coronary arteries. (*Prat. Med. Univ. Præcep.*, t. ii. p. 260.) Respecting these, it may only be added, that the symptoms of angina pectoris are very seldom associated with enlargement of the abdominal viscera; and that, although they are much more frequently connected with the lesions alluded to by FRANK, this connection is by no means uniform, and is obviously not one of cause and effect; these lesions being rather coincident and partial results of the morbid state of the nerves, the altered sensibility of which constitutes one of the chief characteristics of the disease. It may be further stated, that Dr. DARWIN views it as a particular species of asthma, producing cramp of a peculiar kind in the diaphragm, or the other muscles of respiration; and Dr. BUTTER, while he conceives it to be of gouty origin, also refers it to the respiratory organs, particularly to the diaphragm. On these opinions it is unnecessary to comment.

21. Dr. CHAPMAN, to whose valuable paper I have already referred, states, "That the disease is a species of neuralgia, I am entirely persuaded, commencing for the most part in the pneumo-gastric nerve, and spreading in different directions, as other nerves may become involved. The derangement of the heart and other structures, with which it is sometimes associated, I hold to be coincidences or effects, and not the cause; since, among many reasons which might be adduced in corroboration of it, the disease has undoubtedly prevailed independently of such organic lesions, and, conversely, these have existed without occasioning it. But what is the immediate cause of the irritation of the nerves, inducing this neuralgic condition, giving rise to the subsequent phenomena of the disease? This is a question, which hitherto has not been clearly answered. My conviction is, that it is derived from irregular gout, which misplaced, thus operates as an irritant of the nerves, and probably first of those of the stomach."

22. It will be remarked from the foregoing, that JUNIN, DESPORTES, LAENNEC, and CHAPMAN agree so far as to impute the disease to a species of neuralgia of the pulmonary and cardiac nerves, affecting the functions of the heart and respiratory organs, and extending by nervous connection to other parts; the organic lesions found in fatal cases being either coincidences, or effects of the disease; and after an attentive examination of the phenomena attendant on several cases of the affection which have come before me, I see no reason for differing materially from this opinion. With regard to the origin of this affection of the nerves in misplaced gout, I cannot so implicitly agree with Dr. CHAPMAN. The connection had been previously remarked by several physicians, as I have already stated, particularly by those whose names have been adduced, as well as by SCHMIDT and BURTON, — a circumstance favourable to the idea that it is founded in truth; and evidence of

it may even be found in Dr. MUSGRAVE's very excellent, but now scarcely ever noticed work, on Anomalous Gout. WICHMANN, however, has disputed this connection, and apparently with much reason. The notice which had been taken of this morbid relation is very candidly referred to by Dr. CHAPMAN, who has adduced the particulars of six cases in which this affection was evidently connected with gout, and in which recovery took place, after means had been successfully employed to invite this disease to the extremities. In the majority of those cases the patients had never previously suffered a gouty attack, and yet the means employed were successful in causing it to appear in the lower extremities.

23. But whether this disease is merely a form of misplaced gout, or an affection *sui generis*, which, when occurring in persons of a gouty diathesis, the induction of the regular gouty paroxysm in the extremities generally removes, my experience does not enable me to decide. In two persons whom I was lately called to treat, and with whom I have been long acquainted, I have no reason to suspect a gouty tendency; but the connection so satisfactorily established by Dr. CHAPMAN is evidently by no means infrequent, and is one which ought never to be overlooked during the treatment of this most distressing and dangerous disease. I believe that, in addition to the nervous character of the malady, the substance of the heart is often weak, thin, pale, and attenuated, or even softened, as if its substance were imperfectly and unhealthily nourished; and that its cavities, consequently, become occasionally dilated and congested. This view is accordant with the treatment generally found most successful in removing it. In a great proportion of the cases before referred to (§ 10.), of which I had made notes, chiefly collected from authors, dissection had been made in about fifty of those which were fatal; and out of this number nearly forty presented some degree of disease of the heart or large vessels; — most frequently ossification of the valves, coronary arteries, and aorta; and softening and emaciation of the heart. But whether these lesions were rather the consequence than the cause of the disease may be disputed.

24. VI. The TREATMENT of this disease necessarily respects, 1st, the measures which may be adopted during the paroxysm; and, 2d, those which should be resorted to in the intervals, with the view of effecting a perfect cure.

25. 1st, In respect of the means which may be employed during the fit, with the view of diminishing its duration and violence, no very precise or dogmatic direction ought to be given. Much will depend upon the peculiar characters of the case. The patient should always be placed in a state of tranquillity; and, particularly, if the countenance be pale, and the carotids pulsating feebly, in the supine or reclining position. The propriety of bleeding in the fit has been discussed by several physicians, and depends entirely upon the particular features of the attack. Where the symptoms are urgent, the patient plethoric or vigorous, or the pulse full and possessed of tone, there can be no doubt as to the propriety of the measure. Dr. READ (*Dub. Med. Trans.*, vol. i. p. 105.) has recorded a case which well illustrates the good effects of this treatment during the paroxysm. In more questionable cases, where the pulse is weak,

and the countenance is collapsed, bleeding from the arm ought not to be had recourse to. It is doubtful whether or not cupping even should be employed; but where this latter state is not extreme, and especially in cases of intermediate grades of severity, cupping between the shoulders, to a small or moderate extent, as the case may seem to require, will generally afford relief, particularly if used simultaneously with derivatives to the extremities.

26. But in nearly all cases, and still more particularly in those characterised by syncope, and an imperfect action of the heart, frictions with stimulating and irritating substances ought to be previously employed over the anterior parts of the thorax, and stimulants and antispasmodics exhibited internally. As to the extent and repetition of the blood-letting, whether general or local, the practitioner ought to be able to decide, being guided in this, as in other remedial means, by the apparent energies of the constitution, and the state of the vascular system; if these admit, and especially if signs of plethora, or of congestion of the cavities of the heart and large vessels of the chest, exist, the depletion may be carried to a considerable extent, or repeated, according to the relief obtained. The object here is to reduce the body to be moved to a nearer relation to the state of the moving power, at the same time that we endeavour to increase the energy of the latter.

27. I should add, that the propriety of bleeding, in the paroxysm particularly, has been much disputed, and especially by Continental authors. Where the pulse is feeble and soft, and the action of the heart weak, it is generally inadmissible; but, wherever we entertain doubts respecting it, the external and internal use of stimulants and antispasmodics, with frictions, should be cautiously premised, and only local depletions adopted; or depletion of every kind should be entirely omitted until after the paroxysm, when either general or local blood-letting, according to the particular circumstances of the case, may be practised with necessary precautions. I have employed moderate blood-letting in three cases, in which the propriety of the measure seemed questionable, the patients being of spare habits of body, and weakened states of system; but every precaution was taken to prevent immediate ill effects from the operation. In one of the three relief was afforded; in another, the advantage was very doubtful; and, in the third, the disease was evidently exacerbated by it, although slight benefit seemed to result from it at the time. In one of those cases the serum of the blood had a milky appearance, from the presence of an oily matter, resulting from imperfect assimilation. From this evidence, therefore, I infer, that, where there are no signs of vascular plethora or cardiac congestion, or where the vital energies of the patient are depressed, and we presume the substance of the heart is attenuated and imperfectly nourished, we should be extremely circumspect in having recourse to vascular depletions of any description, and should particularly avoid bleeding from a vein; but, at the same time, we should be equally careful not to administer too active stimulants.

28. Next to the employment of depletion, under the above restrictions, in suitable cases, and with the concomitant means recommended, the bowels may be opened by a purgative medicine,

combined with some warm antispasmodic and carminative, as ether, spiritus ammoniac romaticus, camphor, musk, castor, spiritus anisi, &c.; and these may be given, at intervals, subsequently. In the slighter attacks, and where the state of the vascular system and constitutional energies render it prudent to withhold depletion, friction, with stimulating liniments over the thorax and epigastrium, (as the following: —

No. 14. R. Linimenti Camphoræ Comp., Linim. Ammoniac fort., aa ʒj.; Tinct. Capsici ʒij. M.)

the internal administration of antispasmodics, and the exhibition of a purgative medicine, will be sufficient to give some immediate relief. The following will generally fulfil the intention: —

No. 15. R. Infus. Valerianæ ʒxj.; Spirit. Ammoniac Fœtid. ʒss., Tinct. Castorei ʒss. M. Fiat Haustus bis terve in die capendus.

No. 16. R. Infus. Sennæ Comp. ʒjss.; Tinct. Sennæ ʒij.; Spirit. Ammon. Arom. ʒss.; Tinct. Cardanum Comp. ʒj. M. Fiat Haustus statim sumendus, et repet. si sit occasio.

Or the following: —

No. 17. R. Mist. Camphoræ ʒj.; Liq. Ammon. Aret ʒij.; Spirit. Ether. Sulph. Comp ʒj.; Tinct. Camphoræ Comp. ʒj.; Syrup. Papaveris ʒj. M.

29. Emetics have been spoken favourably of by Dr. GOOD (*Study of Med.*, t. i. p. 667.). In a case of great severity, in which vomiting occasionally occurred when the paroxysm was excited by taking food into the stomach, I was induced by this symptom to try the effect of an emetic during an attack, but no benefit was derived from it.

30. The employment of derivatives to the extremities, particularly the lower, is generally beneficial; and ought not to be omitted in the paroxysm, whether we adopt the opinion as to the gouty origin of the disease or not. Stimulating pediluvia, and sinapisms or blisters, with all the other measures employed under similar circumstances in irregular or misplaced gout, had the effect, in the six cases, of the disease published by Dr. СНАРЖАН, of inducing the regular gouty paroxysm, and of affording speedy relief. The affusion of cold water has been recommended by some authors, but it is a dangerous remedy in this disease. Cold epithems to the head have been mentioned by J. FRANK (*Præc. Med. Univers.*, part ii. p. 273.), as having been used with advantage; they seem less objectionable. A similar remark may be applied to the tepid affusion on the head.

31. 2d, The means which may be employed during the intervals or remissions between the paroxysms are either general or topical. With respect to the first of these, a most studious attention to avoid the exciting causes of the disease must be inculcated. Next to this, all existing disorder of the digestive organs should be attended to and removed; and the diet and regimen of the patient strictly laid down and enforced. As the powers of the digestive organs are generally diminished, and the bowels either costive or irregular, vegetable bitters, with an occasional alterative aperient, either given alone, or in combination with an antispasmodic or anodyne, will often prove beneficial. With the view of thus strengthening the digestive organs and removing spasm, SCHÜFFER (*Vollst. krankheiten*, Jun. 1807.) recommended vegetable bitters with opium, musk, camphor, or assafoetida, and ELSNER prescribed the muriate of ammonia

with Hoffmann's anodyne. *Sulphate of zinc*, recommended by PERKINS (*Mem. of Med. Soc. of Lond.*, v. iii.), in doses of a grain, with a quarter of a grain of opium, given twice a day, has a similar action; but it generally is necessary to give it more frequently, and to increase the doses. With the same view I have given the *prussic acid*, either simply, or combined with the oxide of zinc, forming a *prussiate of zinc*, and in one case particularly, with greater advantage than from any other means. I have reason to believe that the *prussiate of iron* will prove equally beneficial; but my experience of its effects is too imperfect as yet to allow me to speak decidedly as to its merits in this disease.

32. In a case which occurred to me a year since, I employed the *preparations of iron*, particularly the carbonate, being led to adopt them by the neuralgic characters of the case, and certainly with apparent advantage; but I should add, that local means were also in operation at the same time. Wherever we have reason to suppose that the heart is debilitated, imperfectly nourished, or attenuated, the employment of tonics, particularly bark, and the preparations of iron, either alone or with antispasmodics, is particularly indicated, with strict attention to diet and regimen. *Auscultation* will be found of service, by intimating to us the particular state of the heart, which must in a great measure regulate our practice.

33. In a case of the disease which came under my care in 1824, I prescribed the *nitrate of silver* triturated with a vegetable extract, as recommended by SEMENTINI. This substance was continued in increased doses, until it occasioned an eruption, resembling nettle-rash, on the skin, — an effect noticed by this physician. The relief afforded by it, after this eruption began to appear, was decided. The patient is, at the present time, in the enjoyment of tolerable health. At the period of my prescribing this substance, I conceived that its exhibition in this disease had originated with myself; but I subsequently found that it had been given in two cases of angina pectoris, with advantage, so long ago as thirty years, by Dr. CAFFE (*Duncan's Annals of Med.*, vol. iii.).

34. *Arsenic*, in the form of Fowler's solution, had been recommended in this disease by Dr. ALEXANDER (*Med. Comment.*, vol. xv. p. 373.), at a period antecedent to the introduction of the nitrate of silver into practice, as an internal medicine; and subsequently by Sir G. BLANE, who gave it with advantage, combined with digitalis and mercury (*Med. Chir. Trans.*, vol. iv. p. 136.).

35. Besides these, preparations of bark, and other vegetable tonics, have been recommended, either alone, or in combination with antispasmodics and anodynes. The *hydrosulphuret of ammonia*, in gradually increased doses (from eight drops to thirty) twice or thrice daily. The different preparations of *valerian*, the *cuprum ammoniatum*, and *sulphate of quinine*, have likewise been employed, and occasionally with decided advantage: from the last of these, combined with an anodyne, particularly with opium and camphor, I have observed much benefit to be derived. The following formulæ may be employed.

No. 18. R. Infus. Rosar. Co. 3j.; Quinine Sulph. gr. j. — ij.; Acidi Sulph. Arom. ℥ x.; Spirit. Æther. Sulph. Comp. 3j.; Tinct. Opil. ℥ xij. M. Fiat Haustus bis in die capiendus. Or,

No. 19. R. Extract. Anthemid. ʒ ij.; Quinine Sulph.

gr. xij.; Massæ Pilul. Galban. Comp. ʒ i.; Camphoræ Subactæ, gr. xv.; Syrup. Papaveris, q. a. Misce bene et divide in Pilulas xxiv., quarum capiat unam ad bina vel tres bis terve quotidie.

Having derived much advantage from the internal use of the *sub-borate of soda* in dyspeptic irritability of the alimentary canal, I was induced to employ it in a case of this disease which occurred to me a few years since, in doses of from twenty to thirty grains, given in the decoctum althææ. It produced some relief; but the case was of the greatest severity, and little benefit, at least of a permanent description, was derived from any means which were adopted, excepting from the prussic acid.

36. *Mercurials* have received the sanction of BRENA. I have employed them in two cases: at first as an alternative; five grains of blue pill having been directed occasionally at bed-time, and subsequently so as to affect the mouth. In one of these the alternative dose had a beneficial effect upon the state of the stomach and bowels; but this was of short duration. When, however, pushed further, so as to affect the gums, great irritability of the system, fever, restlessness, and increased pain, anxiety, and sinking, were occasioned by it. In the other case, evidently connected with hepatic disorder, the blue pill was also at first given as an alternative, on alternate nights. It affected the gums after a few doses, and afforded relief. It was now pushed with the intention of inducing salivation; and a somewhat violent effect was produced on the mouth, which was relieved upon exciting the salivary glands. Decided advantage was now procured; the bowels were kept open by means of a stomachic aperient, an issue inserted in one of the thighs, and change of air recommended. This patient perfectly recovered.

37. Where plethora exists, *blood-letting* in the intervals will be serviceable, with a light abstemious diet. When the paroxysms are apt to occur during the night, I have found an opiate given at bed-time, as recommended by Dr. HEBERDEN, of great service. In one case of this description I gave the *acetate of morphine*, in the dose of an eighth of a grain, but it occasioned such distressing feelings of sinking, and general depression of the powers of life, that stimulants were required; yet the same patient had experienced relief from opium combined with camphor. On one occasion I tried the effects of *iodine* in the form of the tincture; but although its use was adopted with great caution, seven drops only having been given three times a day, it occasioned an increase of all the symptoms, apparently owing to its irritating effects on the digestive mucous surface, and the idiosyncrasy of the patient. I may here notice the practice recommended by SCHLESINGER (*Hufeland's Journ.*, vol. i. p. 57.), consisting in the exhibition, every two hours, of the extract of the *Lactuca virosa*, in doses of two grains, with half a grain of *digitalis*. What effect may we expect from the use of *colchicum*? Where the disease seems to originate in gout, the *colchicum* might be tried; but its use would require great circumspection. In my opinion, it should only be given in combination with stimulants, or antispasmodics and tonics, the spiritus colchici ammoniati being the most promising preparation of it if such a case.

38. Although the patient labouring under this

disease is generally incapable of any, excepting the most gentle, exercise; yet this should be taken under favourable circumstances; and change of air, particularly to healthy, dry, and elevated situations, should not be overlooked. It will generally be observed, that persons labouring under the worst form of the disease, incapable even of walking or sitting upright for any time, will bear well, and even be benefited by, rapid travelling in a carriage. This was first evinced to me by the case of a gentleman of great scientific and literary attainments, residing for a time at Paris, where I was called to him in the summer of 1829. He was anxious to return to England, from a dread of dying abroad. He undertook the journey with me, and was better during it than either previously or subsequently. He has since taken long journeys, with similar advantage, but no means which have hitherto been employed have afforded him more than temporary relief.

39. *Secondly*, Much benefit will be often received from topical means. Under this head *issues* and *setons* deserve particular notice. They have been employed on the insides of the thighs by MACBRIDE and DARWIN. KRIEGLSTEIN and WOLFF also have observed advantage to be derived from them, when inserted either in this or in other situations. I have resorted to a peculiar form of issue in several cases of this disease, and, upon the whole, with much benefit. In one case, however, it failed of having the least good effect.

40. The form of issue to which I allude, and for the knowledge of which I am indebted to my learned friend Dr. HUTCHINSON, is the bark of mezereon root, deprived of its external cuticle, and, after having been soaked for some time in a little water, placed upon the surface of the part from which we wish to procure a discharge. This bark should be confined to its place by means of adhesive plaster, spread on paper of larger dimensions than the part covered by the mezereon bark. The bark may be renewed every night, until it procures a copious discharge. In some cases the effect is produced in a single night, or in twenty-four hours. When the discharge becomes copious the bark may be renewed less frequently. The adhesive plaster serves both to keep the mezereon in its situation, and to retain the discharge, so as to preserve it from soiling the clothes. When it is abundant the plaster may be renewed, and the secretion removed, as its occasional acrimony often tends to heighten and to extend the irritation. In a severe and chronic case of this disease, which occurred to me lately (in 1830), I employed this form of issue, and kept a surface of about four inches square over the left small ribs discharging as long as the patient would endure this treatment. The disease disappeared, and up to this time it has not returned. The advantages of this issue are, that the patient can manage it from the beginning with great ease; and it may be readily increased to any extent, and the discharge augmented, according to the exigencies of the case.

41. Artificial eruptions, from the tartar emetic ointment or plaster, have now usurped the place of setons and issues; but, from a very extensive experience of the former, both previous and subsequent to the publication of an article on them in the London Medical Repository for April 1822, I consider them of inferior efficacy in some diseases, and particularly in this, to the pea-issue, or the issue

now described. It is singular that the advantages to be derived from the production of artificial pustulation, in the treatment of various disorders, were so little known or appreciated until the appearance of Dr. JENNER's pamphlet on the subject, since the practice had been recommended long previously in the Lectures of the second and third MONROS on Morbid Anatomy, as being frequently preferable to the use of blisters; and had been found serviceable by GOODWIN, AUTENRIETH, and KRIEGLSTEIN, in this affection, in which it had been employed by them at the end of the last century.

42. Blisters, either frequently repeated, or kept discharging for a longer or shorter period, have received the sanction of PRICIVAL and many others. But little benefit will be derived from them, unless they be used in the way now named. TULENIUS recommends (*Med. und Chir. Bemerkungen*, i. p. 183.) repeated blisters applied between the shoulders. I agree with him in the selection of this place in preference to others for their application, as well as in the propriety of repeating them frequently. M. LAENNEC states that he has derived great advantage from magnetism, used in the following manner, both in alleviating the paroxysm and in preventing its accession:—He applies "two strongly magnetised steel plates, of a line in thickness, of an oval shape, and bent so as to fit the part,—one to the left præcordial region, and the other exactly opposite, on the back, in such a manner that the magnetic current shall traverse the affected part." (*Œuvres of the Chest*, p. 705.)

43. When the affection is complicated with other diseases, particularly with organic lesions of the heart, or enlargement of the liver, the treatment should be modified accordingly. In order to ascertain the nature of such complications, auscultation may be resorted to; for, although it gives us no information respecting the simple disease, it often enables us to detect the lesions with which it is sometimes associated, and to direct our means of cure more appropriately, and with happier results, than we could otherwise do. When the substance of the heart is weakened or attenuated (§ 23.) tonics, particularly sulphate of quinine, sulphate of zinc, and the various preparations of iron, given in decided doses, are particularly indicated. In other cases, as well as when the liver is affected, issues are generally serviceable. When the disease is connected with enlargement, &c. of the liver, mercury is almost indispensable. In all cases, whether simple or complicated, attention to diet and regimen, a pure air, amusement without excitement, and an equable and contented state of mind, are not only requisite to recovery, but are also necessary to render it permanent.

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ANIMATION, SUSPENDED. See ASPHYXIA.

ANTIPATHY, SYN. *Antipathia*, Gr. *Antipathia*, Lat. *Der Widerwille*, die *Antipathie*, Ger. *Antipathie*, Fr. *Antipathie*, *Aversione*, Ital. *Antipathia Sensilis*, et *A. Insensilis*, Good.

CLASSIF. — 4. Class; 4. Order (Good).
I. CLASS; IV. ORDER (*Author*).

1. *DEVIN*, Internal horror and distress on theception of particular objects, with great restlessness, or with fainting.

2. This singular affection has merely been mentioned by *Cullen*: it has, however, received more attention from *Sauvages*, *Linnaeus*, *Vogel*, *Prouquet*, *Passavant*, and *Good*. The last named writer has needlessly divided it into two species — *sensile* and *insensile* antipathy: the former arising from objects or subjects which strike some one of the senses; the latter from the presence of an object, as soon as it comes within the sphere of some unknown influence, although unperceived by any of the senses.

3. There are numerous instances of singular antipathy on record; and most persons of observation have met with others in the course of their experience. The vulgar explain them generally by considering that the mother had experienced a fright from the objects of antipathy during the early months of pregnancy — and there are, no doubt, some facts which countenance the supposition. Thus, *JAMES the First* could not endure the sight of a drawn sword: *Rizio* was killed at the feet of *Queen Mary* when pregnant with him; and many other instances are mentioned by writers; but more frequently the persons themselves, who are thus affected, have experienced frights during the early months of infancy, or have had their minds early and indelibly impressed by certain subjects. *PETER the Great* had a fall from a bridge into the water, when an infant, and he could not afterwards endure to hear the rattling of a carriage passing over a bridge. Persons often retain the antipathy to the sight of crabs, lobsters, &c. which had been occasioned by fright from them in infancy or childhood. A man-servant in the author's family, advanced in life, had so great an antipathy to the sight of a mouse, that he would fly as fast as he was able from the place where one was seen; and become quite frantic at the sight. He stated that his mother, who likewise had an antipathy to mice, had been distressed by one thrown upon her when pregnant of him. Some persons cannot endure certain odours, from the faintness, or sickness, or sense of anxiety and distress they occasion. This appears to proceed from peculiar idiosyncrasy. I have likewise seen persons who could not touch certain smooth objects without feeling a peculiar shudder or horror, followed by faintness in some. This appears to arise from associations excited in susceptible or sensitive minds.

4. The most singular instances of antipathy are those which occur at the presence of objects unperceived by any of the senses; forming the *insensile* antipathy of *Dr. Good*. Thus, a cat concealed in a room has been known to produce a most indescribable distress or horror in a person who has not perceived it by any one sense, and

has been, in no other way, informed of its presence. Some singular idiosyncrasy, doubtless, exists in such cases. *Sauvages* conceives that an effluvia proceeds from the animal, which, combining with that emanating from the person thus affected, occasions the unpleasant sensations upon his peculiar organisation or idiosyncrasy. This is, perhaps, the only opinion that can be formed on the subject.

5. The TREATMENT to be adopted for the removal of antipathies consists chiefly of resolute endeavours to overcome the morbid impression, by gradually accustoming the mind to its influence. Indeed, this is the only remedy that can be resorted to. Its adoption, successfully or otherwise, will entirely depend upon the mental energy of the patient. But there cannot be a doubt, that all impressions, however unpleasant or distressing, may be ultimately overcome by repetition, and a firm resolution either to endure, or not to be affected by them. The following works will furnish some curious information on this subject, with much trifling, silly hypothesis, and irrelevant matter: —

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ANUS. See RECTUM.

AORTA. SYN. *Arteria Magna*, *Aorte*, Fr. *Aorta*, die *grosse Schlagader*, *Hauptstamm aller Körperpulsadern*, Ger. ITS DISEASES.

1. This most important vessel is liable to all the lesions which have been noticed under the article *ARTERIES*. Some of them, however, when seated in this artery, are so important, particularly as respects their effects upon adjoining viscera, and their extremely dangerous consequences generally, that I propose to give a succinct account of them in this place. In doing this, I shall so far depart from the alphabetical arrangement, in respect of the subordinate heads of the subject, as may be requisite to the consideration of it in strict pathological order. Functional disorder, therefore, of this vessel will be first considered; next, inflammation; and, lastly, those lesions which usually result from inflammation, &c., as aneurism, constriction, obliteration of the vessel, &c.

2. I. NERVOUS PULSATION OF THE ABDOMINAL AORTA. II. CLASS; I. ORDER. This is not an infrequent affection in weak, emaciated, and delicate persons, and particularly hysterical females. It is often associated with collections of air in the colon; and with accumulations of fecal matter or morbid secretions in the cræcum. It is also not infrequently consequent upon neglected dyspepsia.

3. A. The Symptoms are generally very characteristic of the nature of the complaint, and sufficiently serve to distinguish it from organic lesion of the vessel. The morbid pulsation is generally associated with nervous or hysterical symptoms, and is of a variable character. It is increased and diminished, sometimes without any evident cause, but more frequently by mental or moral affections and emotions, or by constitutional causes. Disorders of the stomach, and irregularity of the

uterine functions, also sometimes occasion or re-produce it; and I have observed it to follow upon the paroxysms of sinking or leipothymia to which very delicate females are occasionally liable.

4. Upon pressing the stethoscope firmly over the aorta, the pulsation will be generally felt limited in extent, in its transverse or lateral direction, but it will be very perceptible in the course of the vessel from the bifurcation to the epigastrium. Instead of the gradual, steady, and strong motion or impulse attending aneurism, there is felt a vigorous and smart jerk; and the sound is either merely a slight whizzing, or is scarcely to be heard.

5. The Treatment of nervous pulsation of the aorta will entirely depend upon the peculiar circumstances of the case in which it occurs. If the paroxysm is severe, the preparations of æther, assafoetida, valerian, and ammonia, should be exhibited. I have seen much benefit afforded by strong coffee and green tea in these cases. The dependence of the affection on mental emotions indicates the propriety of advising a tranquil state of mind, and a mild diet, with attention to the regular functions of the bowels. In cases evincing much irritability, mental or corporeal, hyoscyamus, conium, or the acetate or sulphate of morphine, in very small doses, particularly hyoscyamus combined with camphor, will be found useful. The preparations of morphine, however, should be cautiously administered in this affection. In a case which occurred to me some time ago, the sixteenth part of a grain only of the acetate of morphine was followed by unpleasant depression. Upon the whole, more advantage will accrue from the antispasmodics than from the sedatives just named; but in cases characterised by attendant irritability, the combination of substances belonging to both these classes of remedies will be of great service.

6. In all cases of this affection occurring in females,—and the great majority of them do occur in this sex,—the state of the menstrual discharge should receive the utmost attention. When the more distressing state of the affection subsides, a more tonic regimen and plan of cure may be adopted. The bitter infusions and decoctions, particularly those of calumba, cinchona, cascarrilla, and camomile, with the alkaline preparations, &c., and subsequently the preparations of iron, the shower bath, cold salt water bathing, chalybeates, regular exercise in the open air, and light nutritious diet, are the means, chiefly to be depended on. When associated with other ailments, it is generally symptomatic of them, and therefore in such cases the treatment must be directed to the primary complaint.

7. II. INFLAMMATION OF THE AORTA. *Aortitis*, *Aortite*, Fr. *Die Aortenentzündung*, Ger. II. CLASS; II. ORDER. Inflammation of the aorta occasionally takes place, but more frequently in a chronic than an acute form, and commonly consecutively of inflammation of the internal surface of the heart, and during the course of certain states of fever. The internal membrane of the vessel is sometimes alone inflamed, particularly when the disease takes place during fevers, or extends to it from the internal surface of the heart's cavities; but, in several cases, the subjacent cellular tissue, or both it and the internal membrane, are chiefly affected. Aortitis seldom originates in the exterior coats of the vessel.

8. The Causes of aortitis are,—1st, External injuries, as blows, contusions, falls, &c.; 2d, Violent, or too long-continued exertion; 3d, The use of hot, stimulating, and acrid ingesta, spirituous liquors, and the introduction, by absorption or otherwise, of irritating poisons and morbid secretions, &c. into the circulation; 4th, The extension of inflammation from the heart, lungs, pleura, and pericardium, and the suppression of the eruption in eruptive fevers;—M. PORTAL states (*Anat. Med.*, t. iii. p. 127.) that he has met with it in cases of this description;—and, 5th, The causes which are productive of diseases of the heart.

9. The Symptoms can scarcely be stated with any hopes of enabling the practitioner to distinguish this disease, which is generally met with in conjunction with other maladies; particularly fevers, and inflammations of the heart, lungs, pericardium, and pleura, and disclosed to us only by *post mortem* examination. a. When inflammation more or less *acute* extends along the descending aorta, the patient generally complains of a smarting and painful sensation in the direction of the spine, with a violent feeling of pulsation of the aorta; extending to the iliacs, without any appearance of enlargement or tumour; and unaccompanied by smallness of pulse in the remoter arteries, particularly those of the superior parts and extremities of the body. In the more acute cases, a sensation of heat is felt in the region of the vessel, sometimes with oppressive anxiety, leipothymia, or tendency to fainting, and always increased force and vivacity of the pulsations of the vessel.

10. b. The *chronic* states of this disease admit not of recognition until they have produced some one of those organic lesions, which occasion marked obstruction of the circulation, or aneurismal dilations. Dyspnoea upon slight exertion, emaciation, a pale yellowish tint of countenance, palpitations, hypertrophy and dilatation of the heart's cavities, œdema of the extremities, &c. are then the usual symptoms; and, although they furnish no certain evidence of the existence of this disease, yet when they are present, without the signs of narrowing of, or obstruction in, the orifices of the heart's cavities, and of the origin of the aorta, chronic disease of the aorta may be presumed to exist.

11. The Prognosis of this disease, when its existence is presumed, is always unfavourable; on account both of our ignorance of much that is important respecting its symptoms, complications, and consequences, and of the fatal nature, sooner or later, of a great part of the effects to which it gives rise.

12. Aortitis, particularly in its chronic states, is occasionally complicated with hypertrophy of the left ventricle; the hypertrophy either causing the inflammation of the aorta, or the later occasioning the former, particularly when the canal of the vessel is narrowed or obstructed by the effects of the inflammation. The other complications have been already noticed (§ 7—9.). It is chiefly owing to the more frequent occurrence of the disease in a complicated, than in a simple form, that it is so commonly overlooked, and so difficult to be ascertained, even when its existence is suspected.

13. The Lesions produced by inflammation of the aorta are nearly the same as those I have enumerated in the article on the lesions of arteries.

But as these changes, when affecting this important vessel, are often the first step to the formation of aneurism in it, I shall here briefly allude to them as they actually appear upon examination. *Aortitis*, whether occurring simply, or with disease of the heart or other related viscera, presents the results of various grades of activity. In the more acute cases, the internal surface of the vessel is of a deep or dark red, sometimes approaching to purple; and both the internal membrane and the middle coat are easily torn. The connecting cellular structure and the fibrous coat are much more injected with blood than natural; and coagula, more or less firm, and of a fibrinous character, sometimes adhere to the internal surface of the inflamed part: but this is not often observed in the aorta, as the current of the circulation through it seems to wash away the fluid as soon as it is effused, and before it coagulates on the surface which produced it. *Obliteration* of the aorta (see § 53.) may, however, arise either from external pressure, or from false membranes formed in its internal surface, so as to obstruct the current of the circulation in it; or from depositions of lymph between its coats, sufficient to produce the same effect, the obliteration being thus a remote consequence of the obstruction.

14. The results of chronic aortitis, are more frequently met with than those of the acute. These are yellow spots, or yellow curdy matter deposited under the inner membrane, which may burst from the distension and the friability occasioned by the inflammatory state; the curdy matter projecting like a tubercle into the canal of the vessel; bony deposits, which are also just formed under the internal membrane, and in like manner become exposed and washed by the current of the blood in the vessel; thickening and induration of the coats of the aorta; friability and softening of one or more of them; ulceration commencing in the lining membrane, and extending more or less through the exterior tunics, till at last dilatation of the external coats in the form of a pouch, or fatal hamorrhage, ensues; and cracking, and laceration or dilatation, which, with the former lesions, generally originate the different forms of *aneurism* to which this vessel is liable. (See § 18.)

15. Dilatation of the coats of the aorta may first occur, and then the inner or middle coats give way when it has reached a certain pitch: or the laceration of the inner coats, with or without previous ulceration, may take place previous to the dilatation. But either state of disease — dilatation or laceration — especially the latter, seems to proceed from a nearly similar pre-existing change of the internal tunics, one evidently connected with slow inflammatory action. Even dilatation, which has been attributed to debility of structure, is more frequently a result of inflammation, which in fact occasions here, as it does every where else, debility of structure; defective vital cohesion of the texture being a general result of inflammation.

16. TREATMENT. Aortitis requires the same treatment as other acute inflammations. General and local blood-letting, perfect repose, both moral and physical, and the rest of the antiphlogistic regimen, are indispensable. The preparations of *digitalis* in order to quiet the heart's action, cooling aperients to remove fecal accumulations, and counter-irritants to elicit a determination of the fluids to external parts, are

amongst the most efficacious means. In resorting to counter-irritation, care should be had not to employ substances calculated to excite general irritation by their use in this way. The tartarised antimonial ointments or liniments (see F. 305.749.) are the only means of this description; excepting issues, which should be used in this disease.

17. When those symptoms appear which have been stated to result from chronic aortitis, or its effects, local depletions, — particularly when signs of congestion of either the heart, lungs, or head, appear — a restricted diet and regimen, perfect repose of body and mind, attention to the abdominal functions, and the use of the tartarised antimonial ointment, or setons or issues, are the chief means that can be called to our aid. Other remedies may, however, be employed, with the view of alleviating or removing the contingent symptoms and ailments that may supervene.

18. III. ANEURISM OF THE AORTA. — *Aorten-rysmus, die Aortenerweiterung*, Ger. IV. CLASS; II. ORDER, — is a not infrequent consequence of inflammation, particularly of its more chronic forms. The changes in the parietes of the aorta, constituting aneurism of it, are the following: — 1st, *Simple dilatation* of the whole circumference of the vessel; 2d, *Dilatation* of one side only, in a sacculated form, without rupture of its coats, or *true aneurism*; 3d, *Dilatation* of the external or cellular coat of the vessel, occasioned by rupture or ulceration of the internal and middle coats, or *consecutive* or *false aneurism*; and, 4th, *Ulceration* or rupture of the internal coats taking place after their dilatation, and occasioning the still further dilatation of the cellular coat, constituting *mixed* or *compound aneurism*.

19. A. *Simple dilatation* of the whole circumference of the aorta may occur to a greater or less extent along the vessel; it may be limited to a small portion only; or it may occur in several parts, giving the vessel an irregular shape, and forming several oval expansions of it. The second of these is the most common. The dilatation is various in extent: it is frequently as great as twice or thrice the natural calibre of the vessel, or even greater. It is usually more evident in one side than in another, and is attended with some one or more of the organic changes described as consequent upon chronic inflammation of the aorta (see § 13—15., and ARTERIES, Pathology of), particularly thinning and thickening of the coats, thereby resembling passive and active aneurisms of the cavities of the heart. The situations in which this change of diameter of the vessel occurs most frequently, are the ascending portion and arch; but it is not infrequent in the descending aorta. Dilatation of the pulmonary artery is very rare. This simplest form of aneurism, although frequently accompanied with various morbid depositions in the coats of the vessel, never contains laminated coagula, unless the lateral dilatations very nearly approach the state of sacs or pouches, constituting the next variety. In some cases of this form of aortic aneurism, similar changes are also met with in some of the large arterial trunks, as the subclavian, celiac, and iliac arteries.

20. B. *True aneurism*, or extensive dilatation of a portion of the circumference of the aorta, frequently has a neck of less diameter than the body of the sac. It seems to arise from a loss of elasticity and vital resistance of the portion of the

vessel thus affected, in consequence of chronic inflammation and its effects. Owing to this cause the dilated portion of the vessel often presents many of the lesions described as consecutive of the inflammatory state, particularly reddened spots, minute fissures, atheromatous, cartilaginous, or ossific deposits, &c. This variety most commonly affects the ascending portion and arch of the aorta, and shoots out from its anterior or lateral parts. It often attains a considerable size, being sometimes as large or larger than the foetal heart, and generally inclines towards the right side of the chest. The dilated coats of the vessel are generally thicker, and but very rarely thinner than natural, unless in parts of the aneurismal pouch. When it arises from the root of the aorta, and the inner and middle coats burst, fatal extravasation takes place within the pericardium; no false aneurism taking place in this situation, owing to this part of the vessel being destitute of the cellular coat. Coagula do not infrequently form in true aneurism as long as the current of blood in the sac continues to be not much obstructed; but when, owing to the narrowness of its mouth, or to retardation of the current of circulation in it, a partial stagnation takes place, coagula then form frequently in an irregular or confused state, but sometimes in regular layers.

21. *C. Aneurism with ulceration of the internal coats, or false aneurism.* This variety arises, 1st, from rupture or fissures of the internal coats, owing to a loss of their vital cohesion, and to finality consequent upon chronic inflammation, associated with fungous, calcareous, and stomatous deposits; and is often occasioned by accidents, or violent or sudden extension of the vessel; 2d, from ulceration following scrofulous and chronic inflammations, and the detachment of various depositions formed in the internal membrane. Cases have been recorded by LAENNEC and GUTHRIE, wherein fissures of the internal coats of the vessel, instead of producing aneurismal dilatation of the external coat, had dissected it from the fibrous tunic along the greater part of the length of the vessel; but such occurrences are very rare. This variety of aneurism cannot be formed at the commencement of the aorta: it is most frequently met with in the descending aorta, and the part opposite to the tumour or sac is generally not in the least dilated. Numerous instances of this variety of aneurism are recorded by modern authors.

22. *D. Mixed or compound aneurism.* After all the coats of the vessel have been dilated to a certain extent, forming either simple expansion or true aneurism, but, owing to the less extensible properties of the internal coats, conjoined with the effects of previous or existing inflammatory action, rupture or ulceration of them takes place, the impulse of the current of the circulation dilates still further the yielding cellular coat of the vessel, and a sac or cyst is thus not infrequently formed of this coat surmounting the primary aneurism. In this case the perforated internal coats form the neck of the cyst, which is always narrower than the cyst itself. When the ruptured part of the internal coats is considerable, so that the impulse from the current of blood prevents its coagulation in this cyst; or, when in this, as in the other varieties of aneurism, coagulable lymph is not formed, so as to give rise to layers of fibrin-

ous coagula within the sac calculated to support it, rupture of the sac will sometimes occur, and a diffused form of aneurism be the result.

23. *E. Of certain changes connected with aneurism of the aorta.* In some rare instances an aneurism of this vessel has been observed by HALLER, DUBOIS, DUPUYTREN, and LAENNEC, consisting of hernia of the inner coat through the ruptured fibrous coat. But it is obvious that aneurism, or tumours of this description, can seldom reach any considerable size without being either ruptured, owing to the more friable nature of the internal membrane, or confined by granulations and adhesions on its external surface, as shown by the experiments of HUNTER, SCARPA, and HOWE. Solid small tumours, of the size of nuts, and closely attached to the aorta, have been described by CORVISART and HODGSON; the latter of whom supposes, with LAENNEC and BERTIN, that they are the remains of spontaneously cured aneurisms, their sacs having been filled with coagula, and their size afterwards diminished by absorption. The deficiency of the coats of the vessel, at their points of union with it, seems to confirm this opinion.

24. *a.* One of the most important changes connected with this disease is the deposition of fibrine and the formation of coagula on the internal surface of the sac. This process generally appears to proceed by progressive steps; and the deposition thus presents successive layers. The most central of these generally consist of blood only, more or less firmly coagulated; and each layer becomes firmer, drier, and paler, and more and more fibrinous, until the parietes of the sac is reached. In many cases, the most external layers chiefly consist of a whitish or greyish yellow fibrine, more or less opaque and friable. Sometimes they nearly resemble dried paste. The more recently formed coagula are soft, loose, and often only partially adherent to the layer next it. In some cases, blood seems infiltrated between the layers. Those next the vessel are generally united to it by a fine cellular-like tissue, furnishing appearances of a partial organisation. These depositions evidently proceed from the effusion of coagulable lymph from the internal surface of the aneurismal sac, and the partial stagnation or retardation of the blood, favoured by the narrowness of the neck of the sac, and the inflamed, uneven, or rugged state of its internal surface. When neither of these states exists, as is often the case in respect of the first two varieties of the disease, and particularly when the neck of the pouch is wide, neither coagula nor layers of fibrinous deposits are formed. When, however, inflammation of the internal surface of the dilated vessel or of the sac exists, and when a morbid secretion takes place from it, this will originate coagulation of a portion of the blood which comes in contact with it, and form, at the same time, a bond of union between the coagulum and the internal surface of the dilated coats of the vessel. The thickness and compactness of the coagula in aortic aneurisms are often remarkably great, and are chiefly to be imputed to this mode of origin. (See art. BLOOD.)

25. *b.* As the aneurismal tumour enlarges, it generally occasions important changes both in itself and in adjoining parts. Those which respect the sac itself are chiefly thickening of the

dilated coats, or thinning of them; and, in some instances, of both these changes in the same case. When the extension of the sac is considerable, or when moderate, if opposed by a firm substance, as cartilage or bone, ulceration or absorption of the parietes of the sac, inflammation of its more exterior parts and adhesion to adjoining structures; and, ultimately, as the tumour increases, perforation or rupture of the more prominent part, followed by fatal hæmorrhage, take place. The mode in which the aneurism bursts is different, according to its situation and the structure which it compresses and destroys: thus it not infrequently breaks by ulceration and perforation of a limited part of the sac. In some cases, particularly when it opens into a serous cavity, distinct laceration of the more exterior covering occurs; when it reaches a mucous surface or the skin, a slough is formed on its most prominent part, which is soon detached, and fatal hæmorrhage is the result. In the majority of such cases, the proper coats of the vessel may have been long previously destroyed at one part or other of the sac. But, if the aneurism form at the root of the aorta, rupture or ulceration of the proper coats of the vessel is followed by instant effusion of blood into the pericardium. Rupture of the aneurismal tumour, as respects the coats of the vessel, whether bursting into a hollow cavity or upon a surface, or forming a diffused aneurism, is generally transverse; but it is, in some cases, longitudinal, when it implicates all the coats of the vessel; or the rupture of the internal coats is transverse, and that of the external coat longitudinal; the former being almost universally transverse. The effects of aneurism upon adjoining parts require particular notice.

26. *F. Of the effects of aortal aneurisms on adjoining parts, and the situations in which they break.* The effects of aneurisms on adjoining parts necessarily depend upon their volume, firmness, and position. The heart, lungs, trachea, large bronchi, œsophagus, pulmonary artery, large veins, thoracic duct, and various organs contained in the abdominal cavity, may be displaced, atrophied, or partially destroyed, by the compression occasioned by them.

27. *a.* The vena cava is not infrequently more or less obstructed by the pressure of aortal aneurisms. M. REYNAUD (*Journ. Hebdom.* t. ii. p. 109.) met with a case in which this vessel was very nearly obliterated by an aortal aneurism, and M. BOUVLAUD mentions a case in which the superior vena cava was so much compressed by an aneurism at the arch of the aorta, that apoplexy was caused by it (*Dict. de Méd. et Chir. Prat.*, t. iii. p. 403.); and CORVISART (*Journ. de Méd.* par MM. CORVISART, &c., t. iii. p. 85.) and BERTIN, relate similar instances. The thoracic duct has also been destroyed by it, as was observed by M. LAENNEC. Mr. HODGSON and Sir A. COOPER met with cases in which the common carotid, and subclavian arteries were completely obliterated by the pressure of aortal aneurism.

28. *b.* When the pressure of an aortal aneurism destroys an adjoining viscus or structure, the ulcerative inflammation is often extended from the parietes of the sac to them, followed by the adhesion and absorption or ulceration of the parts most compressed, until the tumour bursts, in one of the modes now stated (§25.), into one or other of the following situations:—Aneurism of the

ascending or pericardial aorta generally opens into the pericardium: in three cases it bursts into the pulmonary artery, recorded by Dr. WELLS (*Trans. of Society for Improvement of Med. and Chirurg. Knowledge*, vol. iii. p. 85.), M. SUE (*Journ. de Méd. Contin.*, t. 24. p. 124.), and MM. PAVEN and ZELINK (*Bul. de Fac. de Méd.*, No. 3. 1819.). Aneurism of the arch of the aorta may break into the trachea, œsophagus, pleural cavity, or into the pericardium. That of the descending aorta generally bursts into the pleura, œsophagus, posterior mediastinum, or into the lungs. Aneurisms of the pectoral aorta most frequently burst into the left pleura; they have, however, been known, but in two instances only,—recorded by M. LAENNEC and Mr. CHANDLER,—to open into the spinal canal, having destroyed the bodies of the vertebræ, which are generally more or less injured in cases of aortal aneurism of considerable size. When seated in the ascending aorta, they often destroy the sternum; in both cases causing interstitial absorption of the bone, and often of the parietes of the sac and fibrinous layers of coagula in contact with it, so that the blood washes the bone itself. The cartilages usually resist the pressure of aneurisms, either altogether, or much longer than the bones; and when the periosteum is inflamed by the pressure of the aneurism, an ossific deposit is not infrequently formed around the tumour.

29. *c.* Aneurism of the aorta may, however, destroy life, even without breaking in any of the above directions; either by impeding the action of the heart and displacing it, or by compressing the organs of respiration, or by occasioning congestion, infiltration, and hepatization of the lungs; or by compressing the œsophagus, or injuring some of the thoracic ganglia; or it may destroy or compress the thoracic duct and large veins, as stated above (§27.), to a fatal extent.

30. *d.* The bursting of an aneurism of the aorta is not necessarily followed by instant death, as has been shown by MM. LAENNEC and MANJOLIN, and very recently by Mr. S. COOPER. In a case read by this very able surgeon, at the Medico-Chirurgical Society, where the aortal aneurism had pointed under the left shoulder-blade, but subsequently broke into the œsophagus, several pounds of blood were discharged by vomiting and stool, yet the patient lived for many months afterwards, and pursued a laborious occupation; a second hæmorrhage at last proving fatal. When the sac of an aortal aneurism bursts, and the blood flows into a cavity or viscus, from which it is readily discharged, death usually is soon produced. But when the opening in the sac is so situated that the blood is effused into the cellular structure, and what was before a true or encysted abscess becomes a diffused one, life may be prolonged for some days or weeks, or even longer. This, however, will depend upon the situation in which the rupture takes place, and the nature of the parts into or upon which the blood is effused. When the sac of an aneurism is ruptured, the laceration is generally in the same axis, or nearly so, with the opening into the sac, owing to the impulse being greatest in this direction, unless a divergence is occasioned by the unyielding nature of the parts in this situation, and by the slight resistance opposed by parts immediately adjoining.

31. *G. Of the causes of aneurism of the aorta.*

Diseases of arteries, and consequently aneurism, are much more frequent in men than in women. Mr. HOBSON states, that of sixty-three cases of aneurism, external as well as internal, seen by him, only seven were in females. But the proportion of cases of aortal aneurism met with in females is certainly much larger than this. I have seen three cases of aortal aneurism in females; but I have certainly not seen nearly twenty-four cases in males, which is the proportion here indicated. Syphilis and the use of mercury have been considered predisposing causes of aortal aneurism, but upon no just grounds. I am inclined to believe, with Mr. GUTHRIE, that the habitual use of ardent spirits has a more marked predisposing effect than any other cause with which we are acquainted. A more immediate state of disposition is created in the vessel itself by inflammatory irritation of its parietes, and the consequent diminution of its elasticity and vital cohesion, or power of resistance opposed to the casually augmented impulses of the heart, especially during mental excitement and corporeal exertion. Hypertrophy of the left ventricle, particularly if consequent upon chronic inflammation of the vessel, and influenced by moral and physical causes, will tend to produce dilatation or rupture of the coats of the aorta. The most frequent exciting causes, undoubtedly, are excessive mental emotions, and violent exertion, particularly of the trunk of the body, and when suddenly made; but it seems evident that a morbid state of the vessel has existed previously, at least in the majority of such cases.

32. *H. Of the symptoms and diagnosis of aortal aneurism.* These naturally divide themselves into, — 1st, the rational or general signs; and, 2d, those which are detected by auscultation.

a. *The rational symptoms* of aneurism of the aorta, whilst the tumour still remains concealed in the large cavities, are very equivocal. The effects produced by it also proceed from various other diseases. Those symptoms, even when considered collectively, are extremely fallacious; but when viewed in connection with those which are detected by auscultation, they are very important aids to diagnosis. 1st, Aneurism of the *pectoral aorta* occasions a sense of oppression or infarction in the chest; but this is felt in various diseases of the thoracic viscera. Dissimilarity of the pulse in both wrists is sometimes present; but this is also met with from diseases of the subclavian artery, from tumours pressing upon it, or from an irregularity in the distribution of the brachial or radial arteries. A *purring tremor*, as pointed out by CORVISANT, is sometimes perceptible when the hand is placed upon the middle and upper part of the sternum: when distinctly felt, it indicates aneurism of the ascending aorta: it is also felt above the clavicles in aneurism of the arch, and is one of the surest symptoms of the first and second varieties of the disease; but it is often indistinct when the aneurism is sacculated and contains layers of coagula. This tremor, however, sometimes proceeds from other causes than aneurism, more particularly from the mucous rattle seated in the large bronchi; but, in this case, the purring tremor is not so constant or continued as in aneurism.

33. Pressure from this disease on the trachea

and large bronchi occasions a wheezing or sibilous respiration, which is generally permanent, referable to the lowest part of the throat, and sometimes with a whispering or croaking voice; the breathing is also anxious and laborious. Pressure of the tumour on the œsophagus renders deglutition of solids difficult and acutely painful or lancing, and sometimes even impracticable. But these effects upon the function of respiration will be produced by various diseases of the larynx, and by frequent accumulations of viscid mucus in the upper part of the trachea. The attentive observer will, however, readily ascertain the existence of these affections. Other tumours may also exist and occasion similar symptoms both of respiration and of deglutition; but, in such cases, the diagnosis is often impossible.

34. When the aneurism has eroded any of the bodies of the vertebra, a gnawing or boring pain is felt in the spine, and, when the tumour affects the brachial plexus of nerves, an aching of the left shoulder, extending to the neck and scapula, with impaired power, formication, and numbness of the arm, is complained of. Rheumatism of the shoulder-joint, or parts adjoining, and severe spinal disease, are often attended with similar sensations; and the symptoms referred to the shoulder and arm are frequently present in pericarditis, organic diseases of the heart, and angina pectoris, from the ramification of branches of nerves from the cardiac ganglia to the brachial plexus.

35. Pulsation felt beneath the sternum, or ribs, at the upper part of the thorax, is amongst the most certain signs of this disease: but we should recollect that it will also be occasioned by any tumour interposed between the thoracic parietes and the aorta, and in contact with the latter; by adhesions of the pericardium to the heart and effusions of fluid into the former, and by considerable enlargement or dilatation of the heart itself. Pulsation above the clavicles, although a frequent symptom of aneurism of the ascending aorta or of its arch, may likewise proceed from other causes, as enlarged glands, or various kinds of tumours, receiving the impulse of the subclavian arteries; from subclavian aneurism, and aneurisms of the innominate and common carotid, between which and aortal aneurism the diagnosis is most difficult, as BURNS, COOPER, MONRO, and HOBSON have pointed out. Violent pulsations of the carotids have been adduced as a sign of aortal aneurism; but they may arise from nervous affection of the heart, hypertrophy of the left ventricle, or from obstruction of the flow of blood in the descending aorta, or in the subclavian arteries.

36. When aneurism of the ascending aorta attains a certain size, a tumour is usually formed about the fifth and sixth ribs of the right side: when seated in the anterior part of the arch, it appears at the third and fourth ribs of the same side, at their sternal extremities: when in the upper part of the arch, the tumour rises above the sternum and sternal ends of the clavicles. When aneurism is seated in the descending thoracic aorta, and in the lower part contained in the thorax, it often points, after destroying the ribs and bodies of the vertebra, under the left shoulder-blade, and pushes out this part. The strong pulsations always present in the tumour indicate its nature.

Notwithstanding, it may subside, or altogether disappear for a time under an appropriate treatment. Previous to the appearance of the tumour, the symptoms are, as already shown, extremely fallacious.

37. In the advanced stages of aneurism of the thoracic aorta there are generally coughs with mucous or bloody expectoration, dyspnoea, and even orthopnoea, dysphagia, attacks of spasmodic suffocation, pain in the left shoulder, axilla, inner side of the arm, and ascending up the left side of the neck, with pricking pains in the tumour, and sometimes with a sense of whizzing or rushing at the top of, or under the sternum, and occasionally sensible to the hand. A dragging downwards of the larynx is sometimes complained of. All febrile symptoms are generally absent. Although these are the rational symptoms which are most to be depended upon, they must be viewed with those reservations which I have particularised in the preceding paragraphs.

38. 2d. When the aneurism is seated in the abdominal aorta, acute pain is complained of in the lumbar region, occasionally shooting into either hypochondria, and downwards into the thighs and scrotum. It is generally constant, but is also sometimes intermittent. It is often exacerbated into violent paroxysms, being dull and fixed in the intervals. It is aggravated by constipation, change of position, or pressure on the loins, and is unattended by any sense of heat in the part. In some cases there is also numbness of the lower limbs, as in that recorded by Mr. MAYO (*Med. Gaz.*, April, 1829), where the aneurism was situated between the crura of the diaphragm and the dorsal pains were excruciating. The patient often complains of severe fits of colic, accompanied with spasm of the abdominal muscles, and occasionally there are nausea and irritation of the stomach, but with little loss of appetite. Constipation is always present. Decubitus on the left side or back often produces great distress, and occasions palpitation, which generally subsides upon turning on the face or right side. Coldness, formication, pricking, and numbness of the lower extremities, are not infrequent; and in some cases paraplegia has occurred, with involuntary evacuations of the urine and faeces.

39. The tumour may not become perceptible externally; but as it increases it will press injuriously upon, and sometimes displace, one or other of the abdominal viscera, particularly the stomach, liver, and even the heart. When the tumour can be detected externally, it has generally been in the left side, nearly on a level with the last dorsal vertebra. When large, it often impedes the action of the diaphragm, and thus deranges the respiration. In some cases it has pressed upon the pericardium, and thus had the double pulsation of the heart communicated to it. (See Cases by Drs. GRAVES and STOKES, *Dub. Hosp. Reports*, vol. v. p. 24.)

40. b. Signs furnished by auscultation. — Dulness of sound upon percussion of the upper sternal portion of the chest and cartilages of the right ribs, although present in aneurism of the pectoral aorta, also occurs in other lesions of the thoracic viscera. Dr. ELLIOTSON states, that a thrilling sensation given to the hand only, or chiefly, when applied above, or to the right of the cardiac

region, and a bellows-sound heard in the same situation, may justly give a strong suspicion of the disease. But that neither the bellows-sound nor the thrill, always occurs. In four cases out of seven he found both wanting. LAENNEC never observed the thrill before the tumour became visible externally. He considers that the chief diagnostic of aortal aneurism is a strong and single pulsation, discernible by the ear in the situation of the aneurism, synchronous with the pulse at the wrist, stronger and louder than the action of the ventricles, and unaccompanied by the sound of the auricles. When, however, the aneurism comes in contact with the pericardium, a double instead of a single pulsation of the heart is communicated to the tumour. This was remarked in the cases recorded by M. CAUVELHEIR, and by Drs. GRAVES and STOKES.

41. Dr. HOPE, in his work, which appeared after this article was prepared for press, observes, that it is unimportant whether the pulsations be single or double; for, though the latter, they may be distinguished from the beating of the heart by unequivocal criteria, viz.: — "1st. The first aneurismal sound coinciding with the pulse, is invariably louder than the healthy ventricular sound, and, generally, than the most considerable bellows-murmurs of the ventricles. — 2d. On exploring the aneurismal sound from its source towards the region of the heart, it is found to decrease progressively, until it either becomes totally inaudible, or is lost in the predominance of the ventricular sound. Now, if the sound emanated from the heart alone, instead of decreasing it would increase on approximating towards the præcordial region. — 3d. The second sound actually does sustain this progressive augmentation on advancing towards the heart; and as its nature and rhythm are found to be precisely similar to those of the ventricular diastole heard in the præcordial region, it is distinctly identified as the diastolic sound.* The second sound, therefore, corroborates rather than invalidates the evidence of aneurism afforded by the first; for, if both sounds proceeded from the heart, both would, on approximating towards it, or receding from, sustain the same progressive changes of intensity." (*Diseases of the Heart and Great Vessels*, p. 425.) Besides these views, with which I concur, the sound of the aneurismal pulsation is deep, hoarse, and of short duration, commencing and terminating abruptly, louder than the loudest bellows-murmurs of the heart, and of a rasping or grating character.

42. The sound of aortal aneurisms is generally audible in the back; and, when the descending aorta is the seat, it is louder in this situation than on the breast. If it presents the abrupt, rasping character, when heard on the back, the evidence of aneurism is complete; for, as Dr. HOPE observes, the loudest sounds of the heart, when heard in this situation, are so softened and subdued by the distance as totally to lose their harshness. This is in accordance with the opinion of M. BERTIN, who very correctly observes, that when the stethoscope is applied upon the sternum in aneurism of the subternal aorta, and on the back, near the pectoral spine in aneurism of the descending aorta, the disease may be recognised,

* See art. AUSCULTATION, as to the sounds of this organ.

before any external tumour is seen, by a strong single sound, of greater intensity than that of the heart. The pulsations of aneurismal tumours of large arteries are indeed so intense, hoarse, sharp, and peculiar, as to be readily recognised by a person who has once examined them with the stethoscope, although the sounds they furnish cannot be readily described.

43. The *purring tremor*, already noticed as felt by the hand, may also be ascertained by the aid of the stethoscope. It is chiefly found above the clavicles, in cases of simple dilatation of the ascending aorta and arch and sacculated aneurism in the same situations. In old and large aneurisms, containing layers of coagula, it is generally absent, and is more intense the more unequal and rugged the interior of the diseased portion of vessel, particularly when it is studded with osseous or crétaceous deposits. Dr. ELLIOTSON states, that when the aneurism is large, a single, and more frequently a double, bellows-sound is often heard in the seat of aneurism, distinct from the beating of the heart: when the sound is double, the first is heard along with the pulse, the latter, often the louder of the two, afterwards. The bellows-sound in these cases may be ascribed to the passage of the blood from the dilated aneurism into the narrower commencement of the healthy vessel; and, when the sound is double, the second may proceed from the reaction of the dilated part of the vessel impelling a portion of the blood into the narrow and healthy vessel after the action of the left ventricle.

44. *Ed. Aneurism of the abdominal aorta* is more easily detected by auscultation than aneurism seated within the chest. A constant and powerful pulsation is felt by the hand, and still more remarkably by the ear resting on the stethoscope, accompanied with a brief, loud, and abrupt bellows-sound; but not so hoarse as that of aneurisms in the chest. The pulsation is *single*, unless the tumour comes in contact with the diaphragm and pericardium; and it is either inaudible or very indistinctly heard in the back. By pressing the instrument in various directions, so as to bring it as close as possible to the tumour, its seat and dimensions will be ascertained.

45. *TREATMENT.* — The method of cure first recommended by VALSALVA has been since very generally adopted, not only in aneurisms of the aorta, but also in similar diseases of arterial trunks. I believe, however, that it has been often carried to a very hurtful length. I have seen cases in which aneurismal tumours had existed for a long time without any increase, as long as the patient avoided any marked vascular excitement, and continued his wonted diet; but when repeated depletions and vegetable or low diet were adopted, great augmentation of the tumour and fatal results soon followed. In three cases which occurred in my own practice, and in which the method I am about to recommend was employed, a marked amendment was the consequence.

46. In order to devise a rational method of treating this formidable lesion we should consider, in the first place, the process adopted by nature to remedy it; and having correctly interpreted this process, we should endeavour to assist nature in accomplishing it. We have seen that aneurismal dilatation, &c. of arteries, particularly

of the aorta, (§§ 14, 15,) commences in slow inflammatory action, and that as the coats dilate or rupture, lymph is thrown out, which coagulates the blood, entangling its fibrine and red globules, and thus a fibrinous coagulum, attached to the inner surface of the vessel, is formed, and by its aid the inflamed and otherwise diseased coats of the vessel are strengthened, particularly as the fibrinous layer of coagulum becomes more and more consolidated or organised. Now, what are the circumstances proper to the circulation and state of the constitution calculated to promote this change on the one hand, or to counteract it on the other; for whatever advances it, or assists nature in its completion, will tend to remedy the disease; whilst whatever counteracts it, will lead to fatal results? I shall first consider the measures calculated to counteract the process which nature adopts to remedy the disease.

47. *a.* I believe, that there is no position in pathology more firmly established, since it was insisted upon by JOHN HUNTER, than that whatever greatly lowers the vital energies will impede the formation of coagulable lymph and fibrinous coagula, especially in diseased vessels; and that increased rapidity of the circulation, throbbing of the arteries, abstraction of the fibrine and red globules of the blood, by repeated or large depletions, and the absorption of serous, watery, or unassimilated materials into the current of the circulation, in order to supply the place of the portion of blood abstracted, will, with other effects, inevitably tend to prevent those changes from taking place which we wish to bring about. That large depletions produce increased quickness of the pulse, reaction of the heart, throbbing of the arteries, and all the effects now instanced, must be evident to every thinking and experienced observer; and that these effects are actually those which counteract the changes which nature produces, in order to remedy disease of the circulating system, must be equally manifest. That these results will be still further promoted by undue, or too great abstinence, is no less obvious; and yet, how frequently do we find both inordinate depletion and unreasonable abstinence recommended, in the very teeth of their fatal consequences on numerous occasions, for the cure of aneurisms.

48. *b.* But what are the means which are calculated to advance the process which nature uniformly adopts in order to restore as nearly as possible the vessel to a healthy state? These may be stated, in a few words, to be whatever restrains or retards the action of the heart, without reducing the vital energies of the frame, and the preservative influence they exert, both on the coats of the vessel, and on the surrounding structures. Conformably with this view, *strict quietude of body and mind*, a light digestible diet, the careful avoidance of spirituous and malt liquors, and the adoption of moderate general or local depletions, only if the state of the circulation unequivocally requires them, are chiefly to be relied upon; and, as far as my own observation, and the careful study of the cases recorded by various writers have enabled me to judge, they are the only means which deserve any share of confidence. Whilst change of air is generally beneficial, exercise on foot, or on horseback, especially the latter, must be avoided, and the

utmost attention should be always directed to the digestive, secreting, and excreting functions.

49. When, in consequence of the energetic action of the heart, or the plethoric state of the circulation, or excessive action of the tumour, we determine on depletion, it ought to be performed in the recumbent posture; and the quantity as well as the manner of abstracting it should be such as to prevent any risk from too great depression, and its consequent reaction, whether of the heart or of the arteries. When the disease is attended with paroxysms of palpitation, depletion will be seldom of any use, and should therefore be cautiously employed in such cases. *Local depletions* may be resorted to when local pains are complained of; but, if the tumour has nearly reached any of the surfaces, they are seldom productive of benefit.

50. *Digitalis* has been generally recommended; it may be of some service when exhibited cautiously, and in moderate doses, but its full effects must be guarded against. The same remarks apply to *colchicum*. The *supercetate of lead*, combined with the acetic acid, and small doses of opium, is preferable to digitalis; and any hurtful effect that would arise from it will be prevented by an occasional dose of castor oil. In cases attended with palpitation of the heart, or inordinate pulsation of the tumour, I have prescribed the *sulphate of zinc*, and the sulphate of alumina, generally combined with small doses of *cumpher* and *hyoscyamus*, with considerable benefit as palliatives. The acetate of lead may also be exhibited in a similar state of combination.

51. The application of ice to the tumour has been advised by Continual physicians; but it is often productive of much distress. A lotion, or repeated sponging, and occasionally the continued application of epithems may be employed; morally and physically, with careful prevention of plethora and sur-action of the heart, is indispensable; other means will be useful, chiefly in and either of those recommended in F. 157. 332. 336. may be adopted. Perfect repose, however, as far as they conduce to these states. By endeavouring in this manner to bring about the spontaneous cure of aortal aneurism, it may be supposed that we risk inducing the obliteration of the vessel: but I believe that this is not so likely to occur in the aorta as in smaller arteries; and even were it to occur, the result does not appear so hazardous as the continued increase of the aneurismal tumours; as sufficient evidence is on record of the possibility of a collateral circulation being established.

52. IV. RUPTURE OF ALL THE COATS OF THE AORTA, without aneurismal dilatation of the vessel, is a very rare occurrence, and has been met with only after violent external injuries, such as falls, or leaping from a great height, and from mental excitement, when the vessel has been previously diseased. In the *Ephemerides Physico-Medicæ Naturæ Curiosorum* (*Oec. iii. Ann. ii. Obs. 70.*), a case is recorded, in which it was ruptured by a blow on the hypochondrium. Mr. JAMES has recorded an instance of rupture and instant death in an active seaman, previously in good health, from jumping out of his hammock (*Lond. Med. and Phys. Journ.*, vol. xviii.); and Mr. ANSTON has given a similar case, produced by a violent concussion of the body, from

falling from a scaffold (*Ibid.*, vol. lviij. p. 19.). The most instructive case, however, of rupture of the aorta without aneurism has been minutely detailed by Mr. ROSE (*Lond. Med. and Phys. Journ.*, vol. lviii. 4to. p. 15.). In this case, as in the others, the coats of the aorta were all ruptured. They were more readily lacerated than usual, and the inner coat had a thickened stertomatous appearance. A case is given by Dr. HUME (*Glasgow Med. Journ.*, vol. iv. p. 148.), in which rupture of the aorta took place in a strong man upon getting into bed, followed by death in a few hours. An aperture, the size of a quill, was found in the vessel about two inches above its bifurcation. No account is given of the state of its coats.

53. V. CONSTRICTION AND OBLITERATION OF THE AORTA have been observed by several pathologists. STORCK (*Annales Med. ii. p. 262.*), MECKEL (*Mémoires de Berlin*, 1756), SANDIFORT (*Observat. Anatom. Path. iv. No. 10.*), and Dr. GRAHAM (*Trans. Med. Chir. Soc.*, vol. v. p. 287.), with other recent authors, have recorded cases of extreme constriction of the aorta; whilst M. DESAULT (*Journ. de Chirurg. 1792*), M. BRASDOR (*Recueil Périodique de la Soc. de Méd. à Paris*, t. iii. No. 18.), Dr. A. MONRO (*On Aneurisms of the Abd. Aorta*, p. 5.), Dr. GOODISON (*Dub. Hosp. Rep.*, vol. ii. p. 193.), M. VELLEZ (*Revue Méd.*, t. iii. 1825, p. 326.), and M. RIVAUD (*Journ. Éléton. de Méd.*, t. i. p. 161.), have adduced cases wherein this vessel was entirely obliterated, the circulation having been preserved by the anastomosis and enlargement of the arteries sent off above and below the seat of obliteration.

54. With respect to the origin of this lesion, it may be referred primarily to inflammation of the vessel. But various intermediate changes will necessarily have taken place, from the more immediate effects of inflammation to the complete obliteration of the vessel. It is probable that, in some rare instances, as in large arterial trunks, the transverse rupture of the internal membrane of the vessel, with the consequent effusion of lymph, and formation of fibrinous coagula, may so obstruct its canal as to give rise to its partial or total obliteration, without any aneurismal tumour having formed; and it is not improbable that obliteration or constriction of the canal may have proceeded in other cases, from the advanced stages of the spontaneous cure of aneurism; the deposition of fibrinous coagula, and the subsequent changes which had taken place in them, and the diseased coats of the vessel, having ended in obliteration, and the establishment of a collateral circulation.

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APHONIA. See VOICE, *Morbid States of*.

APHTHÆ. See THRUSH.

APoplexy — DOCTRINE OF. DERIV. and SYNON. *Apoplexia*, from ἀποπλῆσσω, percutio. *Aphonia*, Hip. *Nervorum Resolutio*, Cels. *Morbus Attonitus*, Lommius. *Sideratio*, *Percussio*, Molinar. *Schlagfluss*, Ger. *Apoplexie*, Fr. *Accidente*, *Colpo*, *Gocciola*, Ital. *Apoplexya*, Pol.

CLASSIF. 2. Class, Nervous Diseases; 1. Order, Comatose Affections (*Cullen*). 4. Class, Nervous Maladies; 4. Order, Affecting the sensorial Powers (*Good*). IV. CLASS, III. ORDER (*Author*, see Preface).

1. NOSOLOG. DEFIN. A loss of consciousness, feeling, and voluntary motion; or, in other words, a suspension of the functions of the brain, respiration and circulation being more or less disturbed.

PATH. DEFIN. Consists of defective vital energy, with hæmorrhage, or derangement of the vascular system of the brain, and their consequences.

2. DISTINCTIONS. There are few diseases which present a greater variety of modes of attack, or which depend upon a greater number of lesions of the organ affected, than that now under consideration. Its sources, modes of manifestation, and morbid relations are numerous, and many of them difficult of investigation. These circumstances have given rise to various attempts at arranging the phenomena of the disease in such a way as to indicate the relations which subsist between the changes within the head, on which it depends, and the mode and progress of attack. Apoplexy has long been described as consisting of certain forms, which have been distinguished by some authors as the *sanguine* and *serous*, with reference to the nature of the effusion; by others, as the *nervous* and *bilious*, according to their idea of the more immediate causes. By several writers it has been, with more justice, divided into *active* or *sthenic*, and *passive* or *asthenic*; or *eutonic* and *atonic*, according to the state of the constitutional or vital powers and respiration, and the degree of vascular action accompanying it. All these arrangements are, however, only partially founded in truth: in many respects they are entirely erroneous. Wherein they are either the one or the other will appear in the sequel. *M. CRUVILLIER*, one of the most recent and best writers on the disease, confines the term Apoplexy to the occurrence of spontaneous hæmorrhage in the brain, and divides it into two species: — 1st, That consisting of a collection of blood in a torn part of the brain, or on its surface, from a ruptured vessel; and, 2d, That with sanguineous infiltration into the softened structure — or capillary exudation into, and combined with, its substance. The defects of this arrangement, as well as of this pathology, particularly in regard to practical purposes, must be apparent; for it will often be impossible to ascertain, during life, whether extravasation of blood has actually taken place, or merely great congestion of the vessels, with or

without serous effusion; and many cases of true apoplexy occur occasioning death, as well as where complete recovery takes place, without either of the lesions to which he imputes the disease, having existed.

3. In the account which I will endeavour to give of the disease, its common form of approach and attack will be described; next, the different modes in which the attack is made, distinguishing the principal forms it assumes; and afterwards will be noticed several important states of the malady, arising from peculiar causes and antecedent affections. When detailing the different varieties and states of the disease, it will be made manifest that the distinctions heretofore offered, although occasionally obtaining, have no uniform or even general relation to the lesions existing within the head; that apoplexy, with the symptoms described as characteristic of *serous* effusion, has been frequently found to proceed from sanguineous extravasation; and that the *sanguineous* has sometimes only presented slight serous effusion: a similar objection being also applicable to all the other distinctions above enumerated.

4. OF THE APPROACH, OR PREMONITORY SIGNS, OF APoplexy. The importance of recognising the approach of this disease must be evident to the practical reader; for judicious measures, employed at this period, will often succeed in preventing an attack, or will render it less severe, even when they fail of averting it altogether. The most common precursory symptoms are, a tendency to sleep at unaccustomed periods; a heavier sleep than usual, particularly if accompanied with profound, laborious, or stertorous breathing; stridor of the teeth; nightmare; succussions of the frame, or cramps; a lethargic feeling and drowsiness even during the waking hours; more rarely, unusual wakefulness; pains in different parts of the head, or general headache or mægrim; a sense of weight or fulness in the head, or of pulsation of the arteries; incoherent talking, resembling intoxication; a turbid appearance of the veins of the head, particularly of the forehead; lividity or redness of the countenance; slight or imperfect attacks of epistaxis; loss of recollection; irritability of temper, or unusual serenity or apathy of mind; a disposition to shed tears; suffusion of the conjunctiva; collapsed appearance of the alæ nasi; moats floating before the eyes, or dimness of vision (*amaurosis*); scintillations, or bright or shining coruscations before the eyes during darkness; inability to follow the line in reading; double vision, or a sharper sight than usual; difficulty in shutting or opening the eyes; noises in the ears; dulness of hearing; a sensation of an unusual fetor; dryness of the nostrils; continued sneezing; frequent yawning; singultus; stammering, or indistinct articulation; the substitution of one word for another, or forgetfulness of words and names; difficulty of swallowing, or fits of coughing upon deglutition; leipothymia, vertigo, or a sensation approaching to faintness; difficulty of writing, or inability to spell the words, or to follow a straight line; torpor, or numbness, or pricking of the extremities; itching, or formation of the surface; pains of the joints or limbs; a feeling of fatigue upon slight exercise; partial or slight paralytic affection, chiefly of the muscles of the face, or

confined to a limb or part of a limb, occasioning drooping of the eyelids, imperfect utterance, slight distortion of the mouth; an unsteady or tremulous gait; tripping upon ascending or descending a stair, or in walking; difficulting in voiding the urine, &c.

5. THE CHARACTERISTIC SYMPTOMS, OR THOSE CONSTITUTING THE ATTACK. After one or more of the foregoing signs, or after the succession of two or more of them, and their continuance for a short or long period, the phenomena which constitute the disease supervene. Sometimes the premonitory signs are so slight, and of so short duration, as to escape notice, the attack being severe and sudden: at other times they are very remarkable, and several of them are grouped together, the attack advancing either gradually and severely, or suddenly, and disappearing rapidly; yet recurring after an indefinite time. The mode of approach and attack sometimes has a close relation to the state of internal lesion; but, occasionally, no such relation can be traced, as will be shown and explained hereafter. The premonitory signs, as well as the early part of the attack, generally present more or less either of *augmented* or *diminished* vascular action, particularly about the head, according to the state of the vital powers. The character of the symptoms, therefore, in respect of degree of vascular action and constitutional power, should receive the utmost attention, as being our best guide to a successful treatment.

6. A. In the most severe and sudden forms of attack,—the *apoplexia fulminans* of the older authors, and some of the Continental writers of the present day; the *fortissima* of Dr. COOKE and others; the *apoplexie foudroyante* of the French,—the patient is struck down instantly, sometimes froths at the mouth, has a livid countenance, complete relaxation and immobility of the voluntary muscles and limbs, and inconspicuous evacuation of the urine and feces; and dies very shortly afterwards, either with or without stertor, or rattle of the respiration, with cold, livid extremities; cold perspiration, and sometimes a cadaverous cast of countenance.

7. B. In the more active or *sthenic* forms of attack,—the *Apoplexia fortis*; the *entonic* apoplexy of Dr. GOOD; A. *exquisite* of various authors,—the patient is more or less suddenly seized with profound sopor, the eyes being either open or closed; the breathing deep, slow, sonorous, or stertorous; and the pulse slow, full, hard, or strong: sometimes irregular or unequal. In this state of the disease, the above are often the chief symptoms, no signs of paralysis being observed. But frequently the mouth is drawn to one side, the eyes are distorted, and one eyelid immovable, with relaxation, loss of sensation and of motion of a limb, or of one side of the body; the arm of the non-paralysed side being often closely applied either to the chest or to the genital organs. In this latter state of the disease, there is sometimes also some degree of paralysis of the urinary bladder, or of its sphincter, giving rise to ischuria, or enuresis, or a combination of both. The patient generally lies on the paralysed side, which is relaxed, incapable of motion, and insensible to the application of irritants; whilst the limbs of the opposite side are sometimes subject to spastic contractions.

8. C. In the more gradual seizures, or those of a less complete character,—the *atonic* apoplexy of Dr. GOOD; the *Apoplexia imperfecta*, the *parapoplexia* of various writers,—the patient, after experiencing some of the premonitory symptoms, is seized with alarming vertigo, leipothymia, or feeling of faintness; sickness at stomach and vomiting; disturbance of the senses, particularly of the sense of sight; loss of memory; partial loss of sense, consciousness, speech, and voluntary motion; weak, irregular, and sometimes quick pulse, with more or less of sopor.

9. Besides the foregoing forms of apoplexy,—which differ merely in respect of the state of the constitutional powers, the severity of attack, and the grouping of the symptoms, and not as to the organic lesions which occasion them,—other distinctions offer themselves, which are still more deserving of attention, as generally having a more intimate relation to the changes which are going on within the head, than the degrees of severity of seizure merely. Viewing, therefore the premonitory symptoms as common to all its varieties, I shall divide the disease according to the form, manner, and complication of the attack, and consider, briefly,—1st, The sudden form of apoplectic seizure, in its simple state, and associated with paralysis; 2d, The gradually increasing, or *ingravescent* attack; 3d, These states of seizure complicated with paralysis; and 4th, that form which commences with paralysis, and after an indefinite period passes into complete apoplexy.

10. I. SIMPLE AND PRIMARY APOPLEXY. A. *Description.* In this variety of the disease the patient falls down deprived of sense, consciousness and voluntary motion, is like a person in a very deep sleep, with his face much flushed, tumid, and occasionally livid; his breathing slow, deep, and stertorous; his pulse full, natural in frequency, or slower than usual. Sometimes slight convulsions of the limbs, or contractions of the muscles occur, or contractions of the muscles of one side, and relaxation of those of the other. The attack, in rarer instances, is either ushered in or accompanied with general convulsions, passing into complete apoplexy, or profound coma. The patient may continue in this state of profound stupor for several days; or he may recover after some hours, or even minutes, when judicious assistance has been instantly procured.

11. B. This form of the disease *terminates*, 1st, in perfect recovery,—often in the course of a few hours,—but rarely when the attack has continued longer than one or two days. I have, however, seen cases of perfect recovery in comparatively young or robust subjects, after the apoplectic state had been of several days' duration. 2d, In death, which may take place in the course of a very few hours, or after some days, but most commonly from the first to the fourth day.

12. C. The *appearances* which this class of cases present on dissection may be arranged into—1st, Those which are insufficient to account for the symptoms, or their termination in death; 2d, Those which proceed from intense injection and congestion of the membranes of the brain, and of the cerebral structures; 3d, Those which are accompanied with an effusion of serum, or engorgement

of the vessels of the head, or both; and, 4th, Those which are attended by extensive extravasation of blood.

13. 1st. Cases of apoplexy in which *no morbid appearance* could be detected after death, have been recorded by WILLIS, STARK, POWELL and ABERCROMBIE; and similar cases have occurred to MORGAGNI, TISSOT, QUARIN, OZANANAM, FODERÉ, and HILDENBRAND. It is to this variety of apoplexy that the term *nervous* has been applied by several eminent authors, particularly by KORTUM, ZULIANI, and HILDENBRAND. NICOLAI referred it to spasm of the meninges; LECAT and WEIKARD to spasm of the nerves and vessels of the brain. BORSIERI termed it *convulsive* apoplexy; and TISSOT and some other authors *hysterical* apoplexy. HILDENBRAND conceives that it is the cause of death in contagious typhus; patients dying after profound coma in this disease, without any effusion or appearance of congestion or compression, but apparently from a sudden collapse of the nervous energy of the brain. Apoplectic seizures, rapidly terminating in death, have been occasionally observed to occur in *epileptics* and *maniacs*, as recorded by FODERÉ, NACQUART, BRILLOU, and GENDRIN, without any manifest lesion of the encephalon. This particular state of the brain seems also, in some instances, to obtain in the course of a few other diseases, and to be occasioned by certain external causes, particularly injuries producing concussion of the brain, lightning, extreme cold, and poisonous substance.

14. A case occurred to me of this description in a man aged about forty, who had complained of vertigo, icthyothymia, and loss of recollection, suddenly followed by profound sopor. He had been blooded largely when I saw him. His breathing was not stertorous; his pulse was weak, small, and quick, and his countenance sunk. The brain, on a careful examination, presented no change in colour or consistence, and was even less vascular than usual. The pineal gland was, in my opinion, smaller and softer than natural, and contained scarcely any of the small gritty bodies which are generally found in it. The pituitary gland was not examined, the case having occurred to me a number of years ago, and before my attention had been directed to the nature and functions of this part.

15. 2d. In a large proportion, however, of this class of apoplectic cases, *excessive injection of the vessels of the pia mater, and engorgement of the whole vascular system of the encephalon*, are the chief lesions. The pressure to which the brain has been subjected from this cause, as well as the interrupted state of the circulation, whence the attack most probably proceeded, being sufficient to destroy life in a few minutes, or a very few hours at the furthest. This forms the simplest state of sanguineous apoplexy, and is of comparatively rare occurrence. It constitutes the *coup de sang* of the French, and is observed in those cases of *coup de soleil*, or sun-stroke, which proves rapidly fatal. I have met with it in two cases of this description.

16. 3d. *Serous effusion* is one of the most frequent appearances found in this form of apoplexy, but it seldom occurs alone, being generally accompanied with engorgement of the veins and sinuses of the brain. It is often also observed in the symptomatic and complicated states of apo-

plexy which will come under consideration in the sequel. The very judicious observations which have been made by Dr. ABERCROMBIE and M. CRUVEILLIER, particularly the former, as to the relation which this lesion presents to the apoplectic state, is well deserving of the attention of the pathologist. I perfectly agree with them in considering the distinction proposed between sanguineous and serous apoplexy as not supported by observation; for many of the cases which terminate by serous effusion, exhibit in their early stages all the symptoms usually assigned to sanguineous apoplexy, such as flushed countenance, strong pulse, vigour of constitution, &c.; whilst, on the other hand, many of those accompanied by paleness of the countenance and feebleness of the pulse will be found to be purely sanguineous; even the pre-existence of dropsical effusion, or the leuco-phlegmatic diathesis, or great age, &c. furnish no certain data, although a strong presumption, of the attack being that depending upon the effusion of serum.

17. The serous effusion in those cases in which it constitutes even the chief lesion, cannot be viewed in any other light than in that of a result of pre-existing disturbance of the circulation, depending, as will be more fully alluded to in the sequel, either upon imperfect vital tonicity or action of the vessels, or upon obstructed circulation, especially in the veins and sinuses of the organ, or even upon both. Another circumstance, well deserving of notice, and evincing that the serous effusion is of itself to be viewed as merely a part, and indeed no very important part, of the existing lesions, although the most demonstrable, is the fact also insisted on by Dr. ABERCROMBIE, that the quantity of fluid effused bears no proportion to the degree of the apoplectic symptoms: for we find it in large quantity when the symptoms have been slight; in small quantity when they have been both strongly marked and long continued; and, finally, we find most extensive effusion in the head, where there have been no apoplectic symptoms at all. The inference, therefore, clearly deducible from the most faithfully observed facts, is, that the effusion is not the cause of the apoplectic seizure, but the consequence of that state of circulation on which the disease more immediately depends. Indeed, I am even of opinion that a considerable portion of the effusion takes place either immediately before death, or soon after life is extinct; and that several cases referred to serous effusion have not arisen from this cause, the quantity of serum having evidently not been greater than we have reason to believe naturally exists in the head, as necessary to the regularity of its functions, under the varying states of circulation, and of atmospheric pressure on the surface of the body, from which the unyielding bones of the cranium protect it.

18. 4th. *Extensive extravasation of blood* is a rare occurrence in this form of apoplexy, being most commonly observed in other varieties of the disease. When, however, extravasation is met with, it is either found diffused about the base of the brain, and pressing upon the medulla oblongata, in the fourth ventricle, or in both the lateral ventricles, from rupture of some diseased vessel, or from extravasation of blood near to, with laceration of the cerebral structure at, the surface of

the brain. When extravasation of blood is found, the attack has generally been characterised by symptoms closely approaching those of the next variety, viz. an invading and slight attack, rapidly followed by a short interval of sensibility, which is as quickly followed by profound coma and death.

19. II. THE GRADUALLY INCREASING OR INGRAVESCENT APOPLEXY. — *A. Description.* In this form of the disease the patient is not at first seized with loss of sense and voluntary motion; or if he be so seized, the attack is momentary, and passes off without the use of any remedy. It more usually commences with a violent and sudden attack of headach, very frequently accompanied with paleness, sickness, and vomiting. Sometimes the patient sinks down from its severity, pale, faint, and exhausted; and experiences a slight convulsion, but recovers from this state in a short time. 'This invading and slighter attack generally soon abates, or some of the symptoms subside, and others continue in various degrees or differently modified. The pain is generally referred to one side of the head, and the vomiting sometimes returns. Coldness, paleness, and faintness are complained of, with all the other symptoms indicating a serious shock received by a vital organ. The pulse is weak and frequent, the countenance cadaverous and sunk, and the patient feels depressed, but sensible. After this state has endured from an hour, to two, three, or even more, the surface acquires some heat, and the pulse improves in strength. The face now becomes flushed, and the features expanded. The oppression increases rapidly; he answers questions slowly and heavily, and at last sinks into a state of profound stupor or coma. The period which elapses from the invading attack, to the continued and perfect coma, varies from less than an hour to three days. But Dr. ABERCROMBIE, who has illustrated this form of apoplexy in an able manner, has observed an interval of not more than twenty minutes, and has seen it prolonged to a fortnight.

20. *B.* This is the most fatal form of apoplexy, very few recovering from it. On inspection after death, extensive extravasation of blood is always met with. From the whole history of this class of cases, Dr. ABERCROMBIE thinks that they depend upon the rupture of a considerable vessel without any previous derangement of the circulation, the rupture probably arising from disease of the artery at the part which gives way. He conceives, that, at the moment when the rupture occurs, a temporary derangement of the functions of the brain takes place, but that this is soon recovered from; and the circulation then goes on without interruption, until a quantity of blood has been extravasated sufficient to produce coma. This may possibly be the case, particularly in those instances where the coma soon follows the first attack. I am more inclined to think that a depressed or deranged state of the vital energy and circulation of the brain, similar to that which occurs in the foregoing variety of the disease, takes place at the commencement of the seizure, and that the extravasation frequently accompanies the reaction, supervening on the oppression which precedes the perfect attack; or, if extravasation have taken place in the first instance, that it is only to a small amount, the state of energy of the cir-

ulation of the organ at the time preventing it from proceeding to any considerable extent, and that it is afterwards renewed in the same situation, or even in a different part, upon the reaction which takes place soon after the shock which the first seizure occasions. Dr. ABERCROMBIE is of opinion, that in some cases the extravasation commences with the early part of the attack, and that it goes on until such a quantity has been accumulated as is sufficient to produce fatal coma; and that in others, after the rupture has taken place, the hæmorrhage is stopped by the formation of a coagulum, and, after a considerable interval, bursts out afresh and is fatal. It is by no means improbable that some cases present the phenomena which this accomplished physician contends for, whilst others may proceed in the manner which I have suggested. A chief reason for my believing that this form of apoplexy frequently originates in the way I have stated, is, that I have met with cases in which the disease was gradual, or consisted of several attacks of either incomplete or complete loss of recollection and voluntary motion, from which the patients had recovered, but had at last been carried off by a more severe seizure; and yet, upon dissection, appearances of recent extravasation merely, or of congestion and engorgement, with or without serous effusion, but without the least extravasation of blood, were the only lesions which existed.

21. The rapidity with which the disease advances, will, of course, depend upon the nature of the lesion, and upon the size of the vessel or vessels from which the hæmorrhage proceeds, and the extent of the extravasation. The situation, also, will have some influence; inasmuch as a small extravasation, if it press upon the medulla oblongata or the annular protuberance, will be more certainly and rapidly fatal than a much larger effusion into the ventricles, or into the substance of the hemispheres.

22. *C. The Appearances on Dissection,* chiefly consist of extensive extravasation of blood, most commonly in some part of the brain in the vicinity of the ventricles, as the corpora striata, and thalami optici, or some other situation adjoining those cavities, and which frequently lacerates the cerebral structure, and passes into and fills the ventricles. In some instances the hæmorrhage takes place in a part of the brain nearer to its periphery than its internal surfaces: in such cases the blood ruptures the cerebral substance, and is effused on its surface. In the more suddenly fatal cases, this is observed to have occurred generally towards the base of the brain.

23. In cases of profound coma supervening after a considerable time from the first seizure, the parietes of the cavity formed in the substance of the brain by the effused blood, are softened, discoloured, and broken down, evidently indicating that in these cases softening and disorganisation had either preceded the seizure, or speedily followed the first extravasation, and that a recurrence of the hæmorrhage had produced a lacerated opening, communicating either with the ventricles or the exterior surface of the organ. In a considerable proportion of cases of this form of apoplexy, the arteries are either ossified or otherwise diseased. The veins and sinuses also sometimes present morbid appearances (§ 22).

24. In rarer instances the extravasation of blood takes place in the *cerebellum*. When the effusion is either in this situation or below it, the symptoms are more severe and rapid in their progress than when it is in the substance of the brain. This remark is also applicable when the blood flows from or into the substance of the annular protuberance, or accumulates around the medulla oblongata and foramen magnum. In some of those latter cases, which are much rarer than the foregoing, the fatal result is rapidly produced. In nearly all the cases of extravasation taking place, either within or near the surface of any part of the cerebral structures, it is extremely difficult, if not entirely impossible, to trace its exact source, or the vessel or vessels whence it has proceeded. It is very probable that the laceration produced by hæmorrhage separates several vessels, and thus a greater number are laid open than are concerned primarily in producing the extravasation. Besides, the softening of the surrounding cerebral structure may destroy additional vessels, and give rise to secondary extravasations of blood, either into the original cavity, thus forming a more recent portion or layer of coagulum, or into the surrounding structure in the state of capillary infiltration.

25. Besides the foregoing sources and seats of extravasation, others have been observed. M. SERRES describes a case in which the hæmorrhage had occurred in the substance of the pons varolii, whence the blood had burst into the occipital fossa. It may also take place from the superficial vessels, forming the *meningeal apoplexy* of this writer. In cases of this description, the blood generally seems accumulated between the dura mater and arachnoid; but cases have been recorded, in which the blood appeared to have been discharged from the *retiform plexus* of vessels at the base of the brain, and confined beneath the pia mater. The hæmorrhage may also proceed from *ulceration and rupture of a considerable arterial vessel*. Dr. MILLS met with a case in which it was traced to ulceration and rupture of the basilar artery; and MORGAGNI and SERRES have found it proceed from a similar lesion of the internal carotid. MORGAGNI, DE HAEN, and HUFFELAND have traced the extravasation to the vessels of the *choroid plexus*. This is probably the source of the hæmorrhage when it is confined to the ventricles, without laceration of the surrounding substance of the brain. Rupture of one of the *lateral sinuses* has also been observed: a case of this description occurred to Dr. DOUGLAS. (*Edin. Med. Essays and Observ.*, vol. vi.)

26. *Small aneurisms* in various parts of the cerebral vessels may have formed, and by their rupture occasion apoplexy. SERRES relates cases in which aneurism occurred in the basilar artery, and in a small artery in the circle of WILLIS. (*Archives Gén. de Méd.*, t. x. p. 419.) Similar cases are also recorded by BLANE and HODGSON. Numerous other instances of extravasation from disease of the cerebral vessels have been noticed by MORGAGNI, LILAUTAUD, DE HAEN, BAILLIE, PORTAL, LALLEMAND; and especially by BOUILLAUD, (*Mém. de la Soc. Méd. d'Emul.* t. ix.), and Dr. BRIGHT (*Medical Reports*, vol. ii. p. 266, *et seq.*), who have adduced several proofs of this kind of lesion. In a case of apoplexy recorded

by BANG, the extravasation had taken place between the occipital bone and dura mater. Dr. WATTS, of New York, met with a case in which the hæmorrhage had proceeded from the erosion of a vessel in connection with caries of the inner surface of the parietal bone.

27. *Infiltration* of the blood into, with softening of, the cerebral structure, also seems to form one of the lesions which are sometimes met with in this form of apoplexy, although not nearly so frequently as in the seizures which supervene on, and are accompanied with, paralysis, where this state of softening forms the principal lesion; whereas, when it occurs in this variety, it is one of several other changes, or at least a subordinate one.

28. Perhaps the most common causes of hæmorrhage in this form of apoplexy, particularly when occurring in the substance of the brain, are ossification, earthy deposits in various places, and a peculiar friability, of the vessels of the organ. This state of the vessels, as disposing to aneurism and hæmorrhage, has been well illustrated by SCARPA, and is justly insisted upon as being connected with apoplexy by ABERCROMBIE and CRUVILLIER, and frequently met with in the brains of elderly persons. "There is much reason to believe," Dr. ABERCROMBIE remarks, "that this diseased condition of the arteries of the brain may give rise to a variety of complaints in the head; and that, after going on for a considerable time in this manner, it may at length be fatal by rupture." The remarkable frequency of osseous or cretaceous deposits, &c. in the arteries of the brain in cases of apoplexy, had been noticed by CORNÉLIUS and MORGAGNI. There can be no doubt that changes of this description, in connection with alterations of calibre and of vital cohesion taking place in vessels, the coats of which are remarkably thin and fragile even in the healthy state, will readily dispose them to rupture; particularly when influenced by the varying actions of the heart, and the different emotions of the mind, or when congested by derangement of the vital energy bestowed on them by the ganglionic system, or by disorder of the veins or sinuses, and interruption to the return of blood through those channels. Indeed, there is every reason to believe that the hæmorrhage may even proceed from the smaller veins, in many of the cases where congestion has been concerned in originating it, and especially when the return of blood from the head has been interrupted so as to produce the disease. It may therefore be inferred, that the laceration of the cerebral structure is occasioned by rupture of either an arterial or venous capillary vessel or vessels, and extravasation of blood; and that, in cases of this description at least, the morbid change commences in the vessels, and not in the cerebral tissue itself, the cerebral structure being only consecutively diseased.

29. Cases have also occurred, in which this species of apoplexy has arisen from disease of the *sinuses*, chiefly thickening, induration, and obstruction or obliteration of their canals. When this is the case, the veins running into the sinuses are generally enlarged, tortuous, engorged, and as if varicose. I have met with cases in which all the symptoms of this disease proceeded from the development of tumours in the central parts of the brain, and similar instances have been recorded by several writers.

30. Besides disease of the *vessels* of the brain, lesions of the *membranes*, as ossific deposits, ossification of the *falx* (MORGAGNI), but particularly derangements of the circulation in them, especially in the *pia mater*,—as evinced by copious extravasation on the surface of the hemispheres, or at the base of the encephalon,—and inordinate injection and congestion, deserve to be enumerated among the sources of this variety of apoplexy; although they are, perhaps, more frequently productive of congestion and serous effusion, and consequently of the most common forms of the preceding species. But there can be no doubt that this form, as well as the foregoing, will also sometimes proceed, although much more rarely, from injection and engorgement of the vessels of the membranes and of the brain itself, without extravasation; and that in other instances the degree of congestion, and the accompanying serous effusion, when occurring without extravasation, are not of themselves sufficient to account for the fatal issue, without imputing something to the vital condition of the encephalon itself.

31. III. APOPLEXY COMPLICATED WITH, OR TERMINATING IN, PARALYSIS.—*A. Description.* This form of the disease may take place either suddenly or in the manner of the immediately preceding variety; but more frequently the latter, with the additional phenomenon of paralysis, which may be either coeval with the attack, or supervene as the apoplectic state passes off. In the majority of cases, the patient complains of symptoms referable to the head, particularly of acute pain in one part of it; and is suddenly or gradually seized with stupor or profound coma, loss of speech and voluntary motion—with perfect apoplexy. The mouth is often distorted, and the patient moves the limbs of one side; whilst one or both limbs of the opposite side are found to be deprived of all motion upon their being pinched or tickled. The patient generally lies on the paralysed side, and one or both the opposite limbs are sometimes contracted or slightly convulsed.

32. In other cases, the seizure is less perfectly apoplectic in its character, varying in the degree of coma and disturbance of the respiration; and, as the seizure declines, the paralytic symptoms become the prominent disease. In some instances of this description, the comatose state is slight or of short duration; but the eyelid, or orbicularis of the eye, of one side is paralysed; or the eyes are distorted, the mouth twisted, and the tongue drawn aside upon its being held out. In the majority of these cases, the speech is either altogether lost or greatly impaired; but the patient appears sensible of his situation, and even attempts to express himself by words or signs: but he is frequently incoherent, unintelligible, and without recollection, even when the power of speech is partially retained. In many of this class of cases, complete hemiplegia exists, or gradually manifests itself as the seizure declines. Sometimes one limb only is affected, which is commonly the arm; although the leg is sometimes the only paralysed part. In rare cases the power of swallowing is lost, owing to paralysis of the muscles of the pharynx and the upper part of the oesophagus.

33. This form of apoplexy presents various modifications in its further progress, which may be arranged under the following heads:—

a. The apoplectic attack may, under judicious treatment, pass off entirely and quickly, and leave no trace of its existence after a short time; the paralytic symptoms, particularly when slight, either disappearing with it, or soon afterwards.

b. The recovery from the apoplectic seizure may be more gradual, taking place only in the course of some days; whilst the paralytic symptoms require several or many months for their removal.

c. The apoplectic seizure may be either quickly or slowly removed; but the paralysis may be permanent,—may continue for years, either until the patient is carried off by a subsequent seizure, or by some other disease.

d. In other cases, the patient experiences a very partial recovery merely, or is subject to several exacerbations; is confined to bed or his room, speechless or paralytic, or the latter only, with his mental faculties either more or less impaired, or but little affected; and at last sinks gradually exhausted, after many weeks, or even months; sometimes having become comatose for a short time before death.

e. The apoplectic seizure may pass off in a shorter or longer time, leaving either hemiplegia, or paralysis of a single limb, or impaired speech and mental faculties; and may recur after a period of indefinite duration, and either carry off the patient, or leave his symptoms greatly aggravated. In this latter case, either another seizure again takes place after a time, or he sinks into the state characterising the immediately preceding modification.

34. B. *The morbid appearances* which this variety of apoplexy, in its different states, presents, are very diversified:—1st, In some cases, no lesion is detected sufficient to account either for the symptoms or the termination; 2d, In other cases, serous effusion merely to a slight extent, or little beyond what we have reason to suppose usually exists within the cranium, is found, sometimes conjoined with more or less congestion of the vessels; 3d, In some instances, congestion is the most remarkable and only morbid appearance; and, occasionally, this state is connected with disease of the arteries, generally of the kind already described (§ 28.).

35. 4th. *Extravasation of blood* into a defined cavity is amongst the most frequent lesions met with in this form of apoplexy. We have already seen, that, when the hæmorrhage is very considerable, or bursts its way into the ventricles, or to the surface of the brain, the apoplectic seizure is complete; and, owing to the quantity of blood effused, and the pressure thereby occasioned on the whole encephalic mass, the patient is either suddenly carried off before any paralytic symptoms become evident, or rendered comatose, and incapable of sensation and voluntary motion in every limb. In the majority of cases in which extravasation takes place in this form of apoplexy, there is every reason to believe, from its small extent, that it is merely a consequence of the simple apoplectic state occasioned by congestion or interruption to the circulation,—these states of the circulation being followed by the extravasation, on which the paralytic symptoms chiefly depend.

36. 5th. The extravasated blood presents various appearances, according to the period which has elapsed from its effusion; and the surrounding

portion of the brain, and parietes of the cavity formed by the coagulum, likewise undergo changes — in some cases extremely slight, in others very extensive — which generally have an intimate relation to the various states the patient has presented in the progress of the disease. When the cerebral substance surrounding the extravasated blood continues but little changed, coagula of considerable size are gradually and often completely absorbed. About fifteen or twenty days after the attack, the more fluid part of the effused blood disappears, and the coagulum is firm and of a dark brownish colour. At a remoter period it assumes more of a firm and fibrous texture, and the dark red or brown tint is lost. At last the coagulum is nearly or altogether absorbed; and a small quantity of fibrinous matter, of a slightly reddish colour, which after a time passes into a loose cellular-looking substance, only remains. These changes generally take place at the end of four or five months; but exceptions not infrequently occur. RIONÉ found blood in the apoplectic cavity after twenty months; MOULIN met with a small coagulum at the end of a year; and SENNÉ has observed firm coagula at the termination of two and three years.

37. The parietes of the cavity also experience an important change. They frequently consist of a firm yellowish membrane; and, when the coagulum is altogether absorbed, this membrane forms a more or less complete cyst and well-defined cavity, which is either empty or contains a little very loose cellular substance connecting its opposite sides in all directions; sometimes with yellowish bands of a denser consistence running through it. Dr. AUBUCHON has never found the cavity entirely obliterated; while Dr. BAIGOUR, M. CRUVEILLIER, and some other French pathologists, have seen it in some instances, after a remote period, reduced to a dense nucleus; and, in others, to a linear induration resembling a cicatrix (§ 53.). In some cases the cyst has been found distinctly organised, and with blood-vessels ramified in it.

38. The firm membrane constituting the apoplectic cyst, or covering the sides of the cavity, seems to form soon after the extravasation has taken place, and apparently arises from the lymph thrown out upon the torn surface of brain. It may generally be detected as early as a fortnight or three weeks after the attack, or even earlier. At a remoter period, when the coagulum is removed, it is either empty, or it contains a serous fluid, usually tinged with blood or the remains of the coagulum. RIONÉ and other French writers suppose that the serous fluid is exhaled from the membrane covering the cavity, and absorbed after dissolving a portion of the coagulum. When blood is extravasated into the ventricles in cases of this description, although extravasation in this situation much more rarely occurs in this than in the preceding form of the disease, there seems no doubt of the possibility of its absorption. In this case, the membrane lining the ventricle containing the effused blood becomes thickened, and of a yellowish colour. M. RIONÉ records a case of apoplexy, with palsy of the left side, which was completely removed. The patient died of diseased lungs after eighteen months; and the right lateral ventricle contained a small quantity of coagulated blood, and its membrane was changed as now de-

scribed. Absorption of the coagulum, with the formation of a cyst similar to those formed in the cerebral structure, also takes place when the blood is effused on the surface of the brain, or in the cellular structure of the arachnoid and pia-mater.

39. As the coagulum disappears, the paralytic symptoms in some cases subside; but more frequently the improvement is only partial, and the patient continues paralytic, although the coagulum is either altogether or in a great measure absorbed, and all unusual pressure or interruption to the circulation is removed from the adjoining parts of the brain. It would seem that the fibres of cerebral structure being once ruptured, and not being susceptible of a direct reunion, remain ever afterwards incapable of conveying volition to the paralysed limbs, which are always on the side opposite to the seat of lesion in the encephalon.

40. In some cases of apoplexy complicated with paralysis, the apoplectic symptoms pass away speedily; and the paralysis also disappears, either with the apoplectic attack or very soon afterwards. In these, sufficient time for the absorption of extravasated blood has not elapsed: are we therefore to infer that it has been effused, and recovery taken place notwithstanding? I am more inclined to think that no effusion has occurred in these cases; but that either congestion of vessels in a part of the brain, sufficient to interrupt the functions depending on it, or retardation of the circulation through it, owing to deficient vital energy of the part, occasioning a temporary abolition of its functions, particularly the power of voluntary motion, or both these states, have merely existed. In many cases, one or more coagula, in distinct parts of the brain, or cavities or cysts in older attacks, are found, and generally their number has a relation to the number of seizures. But it occasionally happens that extravasation takes place in two parts of the encephalon, either at the same time or during the same attack; and thus the number of lesions will be greater than of the seizures: and in other cases, particularly in the next form of the disease, the second or even third extravasation takes place in the same situation as the first; forming either an external layer with appearances distinct from the centre coagulum, or a separate portion with the characters of more recently effused blood.

41. 6th. The substance of the brain surrounding the extravasated blood often presents important lesions; chiefly consisting of change of consistence and colour. This portion of brain is sometimes very much softened, and is either colourless, or of a yellowish or greenish yellow tint; or presents the usual appearances proceeding from capillary injection or sanguineous infiltration. This change of structure seems to commence from five to ten days after the sanguineous extravasation, and to arise from inflammatory action having taken place in the part surrounding the effused blood. We have already seen that the formation of a membrane around the coagulum, upon the lacerated surface of brain, is necessary to the reparation of the apoplectic effusion; and that the membrane seems formed from lymph thrown out upon this surface. If the local action necessary to the production of

this membrane and to the process of reparation pass the healthy standard, inflammation is the result; occasioning either a considerable effusion of serum or a second hemorrhage, as already stated, or softening of the surrounding cerebral structure. This consecutive inflammatory action may also give rise to exhalation of serum into the ventricles or into the sub-arachnoid cellular tissue, according to the situation of the primary extravasation; or even, though much more rarely, to a secretion of puriform matter. It sometimes happens, when the consecutive inflammatory action has been slight and of long duration, *in duration* of the surrounding cerebral texture takes place, the intellectual faculties having been generally much impaired in these cases; which, however, are much less frequently met with than those of consecutive softening.

42. There is no part of the brain exempt from the lesions described under this form of apoplexy, although they are most frequently observed in the corpora striata, the thalami, and the substance of the hemispheres. They likewise occur, though less frequently, in the cerebellum, annular protuberance, &c. In all these situations the paralytic symptoms affect the side opposite to that in which the lesions of the encephalon are seated. Some exceptions, however, to this have been recorded; but either the various circumstances connected with the cases, in which they have been said to have occurred, have been insufficiently investigated, or they admit of explanation without invalidating the accuracy of the general inference. Of *forty-one* cases in which extravasation of blood was found in the brain on dissection, by M. ROCHOUX, eighteen were in the left side, seventeen in the right, and six in both sides. Of these forty-one, there were twenty-four in the corpora striata; two in the thalami; one in both these situations; and one under the corpus striatum: making altogether twenty-eight cases in the corpora striata and vicinity. Of the remaining cases, five were in the middle of the hemispheres; two in the posterior part of the ventricles; two in the anterior and interior part of the hemisphere; three in the posterior and interior part; and one in the middle lobe. (See art. BRAIN, *Alterations in Substance—Hæmorrhage.*)

43. IV. APOPLEXY, COMMENCING WITH PARALYSIS, WHICH, AFTER AN INDEFINITE PERIOD, TERMINATES IN A COMPLETE APOPLECTIC ATTACK. — *A. Description.* The commencement of this form of disease is various. The patient often complains of pain, vertigo, and other symptoms referrible to the head; with want of recollection, loss of memory of words, cramps, pains, or with numbness, pricking, tingling, or weakness of a limb or limbs on one side, generally beginning in the hand. The speech is sometimes at first affected, or the mouth and eyes distorted; the limbs being subsequently paralysed. In many instances, the local symptoms continue in a state short of paralysis for a considerable time previously to this state being fully developed. In this case, inflammatory action seated in a part of the brain has often existed, although the symptoms have been so obscure as not to have been detected. After a period of indefinite duration, the paralytic symptoms are followed by a complete apoplectic seizure, occasionally preceded or accompanied with spasms or convulsions of the unparalysed limbs;

or the attack supervenes on repeated aggravation: or after a gradual increase and extension, of these symptoms. In some cases, the patient sinks gradually into a comatose state; from which he may at first be partially roused, and give rational answers, the state of complete loss of sensation and voluntary motion having gradually advanced. From this state the patient seldom or ever recovers. In certain cases the apoplectic seizure is more sudden, but is not so profound, or it passes away more quickly than in others. The apoplectic attack having occurred, the patient is either carried off by it, or he recovers after a time the state in which he was previous to it, or he is left by it in a still worse condition: either gradually sinking, and at last dying in a state of exhaustion or coma; or experiencing a recurrence of the apoplexy, which terminates his existence. This forms a variety of M. CRUVEILHIER'S second species of apoplexy. It is often a result of previous acute disease, proceeding from a feeble capillary exudation.

44. As soon as the patient suffers the first complete apoplectic seizure, the *progress* and *termination* of the disease very closely agrees with the description given of the immediately preceding form; but the appearances observed on dissection are frequently somewhat different, and are altogether much more diversified.

45. *B. Appearances on Dissection.*—Many of the changes observed after this form of the disease are entirely similar to those described under the foregoing head (§ 41.); whilst others fall under a different article, where they are fully described (see article PARALYSIS). There are some lesions, however, which seem more strictly related to the present variety of complicated apoplexy, than either to the other varieties of the disease on the one hand, or to simple paralysis on the other. The most frequent morbid appearance which I have met with in this form of apoplexy, or seen described in the works of BAYLE, RECAMIER, CAYOL, ROSTAN, RIONÉ, SERRES, CRUVEILHIER, LALLMAND, BOULLAUD, AMERCOMBIE, and GENDRIN, who have paid great attention to its pathology, consists of softening, with a reddish tint, of a portion of the brain. In cases which I have examined, the softening was accompanied with *infiltration* of blood into the cerebral structure. In some cases the softening and infiltration increased from the circumference to the centre, whilst in others the change from the healthy state to this took place abruptly; the diseased part presenting the appearance of a cavity containing a softened and reddish pulaceous mass, which could be removed without evincing any connection with the surrounding brain. In some instances the softened part is of a yellowish green tint, and the surrounding portion of brain more vascular than natural. The parts most commonly affected with this lesion are nearly those which are most frequently the seat of hemorrhage; the chief difference being, that the grey substance of the hemispheres is oftener the seat of the former than of the latter.

46. As to the origin of this particular form of softening of the cerebral structure, I must refer the reader to what I have adduced respecting it in the article on the *Alterations in the substance of the BRAIN*. As, however, the origin of this

species of softening has a very intimate relation to the treatment of this class of cases, it becomes a matter of importance to trace its origin. The French pathologists, with very few exceptions, ascribe it to inflammation of the cerebral structure. There can be no doubt that it sometimes proceeds from this source. But as soon as the inflammatory action has given rise to this change, the vessels no longer enjoy their requisite tone, — their vitality has evidently become exhausted, and they allow the red particles of blood to escape from them, and to be infiltrated into the cerebral structure; as we observe sanguineous infiltrations into the parenchymatous structures to occur in scurvy or in purpura hemorrhagica. When the softening arises from this cause, the paralytic and apoplectic seizure more frequently is met with in patients not far beyond the middle age, and whose constitutions are not much injured; and the attack is more commonly preceded by acute or febrile symptoms, than when it proceeds from the cause about to be adduced.

47. Dr. ABERCROMBIE considers that it also depends upon disease of the arteries, chiefly ossification, thickening, contraction, or separation of their inner coat, occasioning a failure of the circulation, and gangrene of the part of the brain which is supplied by the diseased vessels as is observed to take place in the toes of aged persons. This may possibly occur; but still we have no satisfactory proof that it does so. This far I may concede, — that the disease proceeds from a change of state of the capillaries of the part, and of the cerebral structure in which they ramify, otherwise, we should not observe infiltration of blood, and great softening of structure; but which of the two is the primary lesion is very difficult to determine. Most probably, both are dependent upon the state of that part of the ganglionic system which supplies the encephalon, particularly its blood vessels.

48. The other appearances with which this lesion is associated in this form of the disease, consist of the morbid states of the arteries of the brain already noticed; of aneurisms (BLANE records a case which arose from rupture of aneurism of the internal carotid); congestion of the vessels, veins, and sinuses; more rarely extravasations of blood in some one of the situations and states already noticed, or the remains or marks of antecedent hæmorrhage; empty cysts from which coagula have been absorbed; portions of the brain in various degrees of induration; purulent collections in different forms; encysted and other tumours of various descriptions; a large proportion of the lesions described in the articles on the *Alterations in the substance of the Brain*; thickening, injection, or ossifications of the membranes; and, occasionally, accumulations of serum in the sub-arachnoid cellular tissue, and in the ventricles. The further exposition of this form of the disease, especially in relation to the paralytic symptoms, falls more appropriately under the head of PARALYSIS, where they are fully discussed.*

* I may subjoin the following classification of apoplexies, according to a different principle to that adopted above. It is based upon the chief pathological states from which the attack proceeds, and approaches nearer the arrangements adopted by the German pathologists, particularly HARKLES (*Der Specielle Neurologie*, &c., p. 133, Cobl. 1824), than that usually followed by our own writers. In some respects it may be preferable to that which has

49. OF THE PHENOMENA OF THE DISEASE WHICH HAVE NO PARTICULAR DEPENDENCE UPON ITS SEPARATE FORMS.—A. There are certain symptoms occasionally met with in all the states of apoplexy, to which I shall briefly refer. The pulse is frequently full, strong, and slow, or of natural frequency, particularly in the first, third, and occasionally in the fourth varieties into which I have divided the disease. In other cases, especially in those which are extreme, and particularly in the second and fourth varieties, it is often small, feeble, and unequal or irregular. The respiration, both as to strength and frequency, generally presents similar characters with the pulse: when the latter is slow and strong, the former is deep, slow, and stertorous; and when the pulse is weak and frequent, respiration is quick, less laboured, and much less sonorous. Deep sighs are occasionally observed in all the forms of the disease. The state of the pupils is very various: sometimes they contract and dilate independently of the influence of light; but in the first and third varieties they are generally dilated; and they are often contracted, or one is contracted and the other dilated, in the second, third, and fourth varieties. Contraction of the pupils has been remarked as a not infrequent attendant on the worst forms of apoplexy, and particularly on those characterised by a tendency to spastic action, by ARÉTÉUS, and recently by CHEYNE, COOKE, and various other pathologists. The features are usually large, bloated, relaxed, and flushed; but they are sometimes pale, and even collapsed, particularly in the ingravescent and consecutive forms of the malady. The fecal and urinary evacuations sometimes take place involuntarily, in all the varieties of the disease.

50. The muscles most frequently paralysed, either antecedently, consecutively, or at the same time, with apoplexy, are those of the superior and inferior extremities, particularly those of the superior; next those of the tongue and face; and lastly, the muscles of respiration. In general, the power of feeling is more or less deficient, as well as of voluntary motion of the affected

been now fully described, particularly as I have here placed those forms of the disease which depend upon the nervous or vital energy of the encephalon in a more prominent point of view, than they can hold in a classification framed according to the symptoms and mode of seizure, in connection with the internal lesions.

I. SANGUINOUS APOPLEXY, — with extravasation of blood in some part within the cranium.

II. CONGESTIVE AND SEROUS APOPLEXY, — from obstructed return of blood from the head, and frequently from the metastasis of gout, rheumatism, or eruptive diseases.

III. ASTHENIC APOPLEXY, — *Nervous Apoplexy of Authors*, — from depression, exhaustion, or abolition, of the vital influence bestowed on the encephalic organs, and occasionally giving rise to extravasation of blood, or of serum, and to congestion of the cerebral vessels.

A. From intoxication. B. From narcotic poisons, and mephitic gases. C. From a stroke of lightning. D. From the influence of great or continued cold. E. From exhaustion of the mental and bodily powers, and from convulsive affections. F. From violent mental emotions.

IV. APOPLEXY FROM PRE-EXISTING CHRONIC LESIONS WITHIN THE CRANIUM, — from tumours, inflammations, abscesses, &c. &c.

V. TRAUMATIC APOPLEXY, — From external injuries. Conclusion, or effect of the vital powers of the organ; — pressure from depression of bone or extravasation of blood.

VI. COMPLICATED APOPLEXY, — supervening at the invasion, or advanced stages of febrile diseases of an adynamic or asthenic type.

limb or side; but sometimes voluntary motion is lost, whilst sensation remains. There are also very rare cases recorded, where the feeling only was lost, and sensation has been observed paralysed on one side, and motion on the other. These phenomena will be more particularly considered and explained in the article on PARALYSIS. As the patient convalesces, sensation returns in the paralysed limb before the power of voluntary motion; and generally the lower extremity recovers its functions before the upper, unless disease of the spinal chord, producing more or less of paraplegia, coexist with, or is consequent upon, the apoplectic disease, — an occurrence which is sometimes met with.

51. *B. The duration of the apoplectic state is extremely various. The attack may terminate fatally in a few minutes, particularly the first variety; or it may pass away in as short a time, and the patient recover, especially in this and the third form of the disease. Dr. COOKE thinks that death seldom or ever occurs in less time than one or two hours, in genuine apoplexy; and, I believe, as respects those apoplexies which consist of cerebral hæmorrhage, this is generally the case; but when large hæmorrhage takes place into the ventricles, and about the base of the brain, death is very quickly produced. An attack often, however, continues for a much longer time, generally from several hours to as many days. If no remission of the symptoms be observed after twenty-four hours, the disease generally terminates unfavourably. The progressive or ingravescent variety sometimes continues for several days; the apoplectic state becoming more and more profound; and at last usually ending fatally.*

52. *C. The termination of apoplexy has already been noticed, when describing the different forms of the disease. I may, however, remark generally that the attack may end as now stated, or it may go off completely, leaving no further ill effects than a tendency to recur upon the action of the remote causes. This favourable termination, however, is entirely owing to the nature of the causes; a larger proportion of cases either terminates in, or is accompanied with, paralysis. When the speech and mental faculties are affected in a marked manner from a first attack, they return but slowly; the memory, the strength of mind, and force of character, are more or less impaired; the patient becomes weak, puerile, easily excited, and timid; and a disposition to a subsequent attack is produced, which either carries him off, or weakens still further his mental and motive powers, until perfect imbecility of mind and body is occasioned. Sometimes, after repeated attacks, with marked injury of the mental faculties, a considerable diminution of the volume of the cerebral convolutions is observed upon dissection, — they no longer fill the cranial vault; but the space is occupied by a greater or less quantity of serum infiltrated in the sub-arachnoid cellular tissue, and not only on the exterior surface of the convolutions, but also between their anfractuosités. In some cases this change is more remarkably developed in certain convolutions than in others, or in those of one lobe or hemisphere than in the rest.*

53. *D. The changes which the seat of hæmorrhage undergoes have already been described at*

length (§§ 37—40.). The most remote changes which have been observed in the ruptured part of the brain, from which the coagulum has been absorbed, are, in some cases, a complete cyst, either empty or enclosing a little reddish serum, or a loose cellular substance; in a few instances, a firm nucleus, seemingly consisting of the fibrinous remains of the coagulum, and in others, according to CRUVEILHIER, merely a linear induration from the cicatrization of the lacerated cerebral structure. In whatever form the remains of the coagulum and laceration may present themselves, at periods remote from the seizure which these lesions occasioned, no direct union of the divided fibres of the brain is observed to have taken place. Even when an apparent union of the divided cerebral structure is noticed, it will be found to have been brought about indirectly, and through the medium of the cellular or fibrinous substance left after the absorption of the coagulum; the cavity having gradually closed, owing to the atrophy of the ruptured fibres, and the hypertrophy of those surrounding them from having had to perform additional offices.

54. *E. Of the supposed relations subsisting between the seat of hæmorrhage, or lesion of the brain, and the symptoms accompanying and following the attack.* — M. CRUVEILHIER states that those parts of the brain most subject to hæmorrhage, or laceration from the external injuries occasioning counter-stroke of the cranium, most commonly present extravasation of blood in apoplexy. This seems to some extent correct, as far as relates to corresponding frequency; but there are parts of the encephalon, occasionally the seat of apoplectic hæmorrhage, which are seldom or never so affected from this species of external injury.

55. *a.* It has been supposed by MM. SERRRS, FOVILLE, and PIEL-GRANDCHAMP, that lesions of the corpora striata are followed by paralysis of the lower extremities, and those of the thalami by palsy of the upper. This inference is, however, neither supported by anatomy, nor borne out by facts: a mere coincidence of internal lesion with external signs cannot always warrant the inference that the disordered function has its origin in the part diseased, especially when we are ignorant of the offices of such part. The upper and lower extremities are most frequently paralysed from apoplexy; and the corpora striata and thalami are the parts in which the apoplectic hæmorrhage most frequently occurs. Hence the coincidence of these lesions of structure and functions must be frequent. But these parts of the brain are sometimes diseased without the correspondent affection of the limbs contended for; whilst, on the other hand, the extremities are often paralysed without any lesion of those parts.

56. *b.* The disciples of GALL consider the anterior lobes of the brain as presiding over the organ of speech, and as the seat of the memory of words, &c., and that therefore lesions of this part affect this organ, as well as this particular state of recollection. M. BOUILLAUD has supported this opinion by the history of several cases; and M. CRUVEILHIER has controverted it, by adducing the details of others (*Nouv. Biblioth. Méd.* 1826.). Several other French pathologists have also espoused opposite sides, and adduced cases supporting their views. The inference deducible

from the facts already accumulated is, that a coincidence of lesion of these functions, and of these parts of the brain, is sometimes observed; but the relation between them is neither so uniform nor so precise as to warrant the opinion that there exists any necessary dependence of these particular functions upon the parts of the brain to which they have been ascribed. Without reference, however, to the part of the brain on which the memory of words depends, it has been remarked by M. ITARD, that aged persons struck by apoplexy frequently lose the recollection of them in the following order:—First, want of recollection of proper names, next of substances, afterwards of verbs and adjectives; which last are often the only words which can be recollected.

57. *c.* It was contended by MM. DELAYE, FOVILLE, and PINEL-GRANDCHAMP (*Nouv. Journ. de Méd.* 1821.), that disturbance of intelligence depends upon lesion of the grey substance of the brain, whilst disorder of locomotion proceeds from change of the white or medullary structure. But this doctrine seems no better founded than the preceding, being open to the same objections which have been urged against them. Lesion of the cineritious substance is, perhaps, more frequently accompanied with spasms and convulsions at the commencement of the attack, than when it is seated in the medullary structure.

58. *d.* The cerebellum. MORGAGNI has recorded that VALSALVA once stated to him, that a case of apoplexy to which he was called was seated in the cerebellum. Dissection verified the diagnosis; but he does not mention the symptoms on which VALSALVA founded his judgment. M. SERRES, adopting the doctrine of GALL, says, that erections, or seminal emissions, in men, and discharges, sometimes of a sanguineous appearance, from the female organs, are the distinguishing signs of apoplexy of the cerebellum. M. CRUVILLIER states, that he has seen apoplexy of this part, but that these symptoms were not present. Some cases have certainly occurred to countenance the opinion of SERRES, and others to overthrow it. It seems more probable that the effusion in the cerebellum affects the medulla oblongata, and occasions a partial asphyxia and stasis of the blood, from the influence of this part upon the respiratory class of nerves, and thus induces a state favourable to erection. CRUVILLIER states that he failed to produce this symptom by irritating the cerebellum of dogs. I may, moreover, add, that the symptoms contended for by SERRES, and the followers of GALL, as distinctive of cerebellic apoplexy, have occurred in cases wherein the cerebellum has been found sound on dissection.

59. Apoplexy of the cerebellum occasions, *ceteris paribus*, a more serious lesion of the functions of circulation and respiration, and is more dangerous than apoplexy of the cerebrum. The symptoms are evinced on the side opposite to the seat of lesion, in this as in other apoplexies. The opinions that the cerebellum is the regulator of all the voluntary movements, and the source of all sensibility, according to certain Continental physiologists, particularly MM. FLOURENS, FODERA, FOVILLE, and PINEL-GRANDCHAMP, have not been confirmed by the history of apoplexy

seated in it. The hypothesis of ROLANDO, professor at Turin, that the cerebellum performs a function analogous to the Voltaic pile, in generating a fluid or principle requisite to the functions of voluntary muscular action; and that it transmits this fluid, under the influence of the brain, and through the channel of the spinal chord and nerves, to the muscles; seems much more accordant with comparative physiology, and the pathology of the nervous system.

60. *e.* The annular protuberance—the point of junction of the spinal chord, brain, and cerebellum—the centre of the cerebro-spinal system, is sometimes the seat of apoplexy, notwithstanding its density. When the extravasation of blood in this part is to any considerable extent, immediate and complete paralysis of the trunk, and of both the superior and inferior extremities, is produced, with the most profound lesion of respiration, quickly followed by death. When the effusion is to a small extent, and in one side of the protuberance, the paralysis which results seems on the opposite side of the body, as may, indeed, be inferred from anatomy. The extravasation must be to a small extent, to admit of recovery. Sometimes the effused blood is observed to have been disposed in layers between the lamina of white matter entering into the structure of the protuberance. The reparation of the apoplectic lesion of this part takes place in a similar manner to that which I have already described (§§37—40.). It would seem that the smallest division of the fibres of this part is followed by permanent affection of feeling and motion.

61. Connected with this subject, M. FLOURENS concludes, from his experiments and observations, that the cerebral lobes, the cerebellum, and the tubercula quadrigemina, may lose a considerable but limited portion of their substance, without losing the exercise of their functions; and they may re-acquire them after being totally deprived of them: that the spinal marrow and the medulla oblongata are the only parts which directly affect the same side of the body with that in which they themselves are affected; whilst the tubercula quadrigemina, the cerebral lobes, and the cerebellum, alone produce these effects upon the opposite sides to that in which they are diseased,—the former acting in a direct course, the latter in a cross direction. These inferences, however, want confirmation in several particulars.

62. DIAGNOSIS.—Apoplexy is, in general, readily recognised: but it may occur in such a way and under circumstances which will render its diagnosis a matter of difficulty. Thus we may be called to a patient, of whom nothing is known, with the following symptoms:—Coma, laborious or stertorous breathing, relaxation or rigidity of the limbs, complete loss of consciousness; he may or may not have had convulsions, or a blow upon the head; there may be hemiplegia or not. In this case, is the patient in a state of dead drunkenness, asphyxied, poisoned by narcotics, or affected with the profound coma consequent upon epileptic or hysterical convulsions? Is it concussion of the brain; the advanced effects of organic disease within the head—as of cysts, abscess, or of inflammation terminating in effusion; or fever, either at its commencement or close, with apoplectic symptoms? It is true that these states differ but little from apoplexy;

APOPLEXY — PROGNOSIS.

the difference consisting chiefly in grade, unless hæmorrhage has taken place, when paralysis generally manifests itself. But it should be at the same time recollected, that there is sometimes hæmorrhage without local palsy, and even palsy without sanguineous extravasation. The diagnosis of such cases is very important; but without information of the circumstances connected with the history of the case, its difficulty is extremely great. I once treated a case of adynamic fever, originating in infection, and commencing with sudden loss of sense and voluntary motion, as a case of apoplexy, and gave an opinion accordingly. The history of the case, and its subsequent course, showed the error. When paralysis is present, the nature of the case is then manifest, although the particular cause of the palsy may be a matter of doubt. We should, therefore, enquire after this symptom, by observing the attitude and motions of the patient, by pinching the extremities, tickling the soles of the feet, &c. The existence also of stertorous, laborious, or snoring respiration, will confirm the diagnosis.

63. It should be kept in mind that, whilst the comatose state consequent on *epilepsy* or *hysteria* may closely resemble apoplexy, the convulsive stages of these diseases may give rise to the true apoplectic state. But, in the usual consecutive coma of epilepsy there is no stertorous breathing, and the limbs are not so relaxed as in apoplexy. The *coma*, which supervenes to inflammation of the membranes of the brain, is chiefly to be distinguished from apoplexy by the antecedent symptoms, and by the loss of sense and cerebral function being greater than the loss of motion; independently of the association of paralysis so frequently characterising the apoplectic seizure.

64. The symptoms consequent upon *injuries of the head*, whether simple concussion, or compression from depressed bone, or extravasation of blood, are in all respects identical with certain of the varieties of apoplexy described above, and are not to be distinguished from them, but in respect of the exciting cause. A similar remark is applicable to cysts, tubercles, and other tumours slowly developed in the encephalon, which sometimes produce no very marked external sign of disease, until apoplexy and still more frequently hemiplegia suddenly take place. In such cases there is no actual difference in the proximate cause of the abolition of function, but only in the compressing body whereby abolition of function is occasioned.

65. In cases of loss of sense and voluntary motion from the action of *narcotic poisons*, or breathing *deleterious gases*, there is also little actual difference from several of the apoplectic states described above (§ 10.), excepting that the functions of the lungs have, in the case of breathing deleterious gases, been primarily affected; for the chief lesion is to be referred to the state of *nervous energy* and *vascular action* in the brain, its circulation being retarded, and its vessels congested with dark blood. Indeed, in many such cases, the true apoplectic condition, either with or without hemiplegia, is produced; although, in the majority, the state of profound but simple coma is the result.

66. In *asphyxia* the lesion of function commences in the lungs, the pulse being either diminished in strength or entirely abolished; whilst

in apoplexy the lesion is in the head, and the pulse is generally fuller and stronger than natural; but the exceptions to this state of pulse are numerous. In *syncope*, the marked diminution, or almost entire absence, of the pulse, paleness of the countenance, and the very gentle or scarcely apparent respiration, are sufficient to distinguish it from apoplexy, even in its weakest forms; excepting at the commencement of, or early in, the apoplectic attack, when the states of vital energy of the brain, in both affections, are not materially different.

67. Complete intoxication may readily be mistaken for apoplexy; and, in some cases, may terminate in this disease. This state of intoxication is evidently attended with congestion of the vessels of the encephalon. The smell of the breath, and the appearance and smell of the matters thrown up by the retching that frequently accompanies intoxication, will readily distinguish this state. The greater frequency, also, of the pulse, and absence generally of stertorous breathing, in drunkenness, will also assist the diagnosis. But these symptoms are occasionally observed in apoplexy; and, on the other hand, the pulse may be slow or natural, and the breathing stertorous in the former: but this is very rare, particularly slowness of the pulse.

68. In *concussion* of the brain, the state of its circulation, and the influence of that portion of the ganglial system which supplies it, are as remarkably depressed as in the weakest form of apoplexy,—in concussion from the shock received, in apoplexy from internal causes; in many cases no difference existing. In some instances, however, even of this form of apoplexy, the respiration is much more laborious, the countenance somewhat more tumid or distorted, and the pulse fuller and more developed than in concussion. In the stronger states of apoplexy there can be no risk of mistake, the characteristic symptoms of each being very different.

69. **PROGNOSIS.**—An attack of apoplexy is always dangerous:—1st, It may be fatal immediately; 2d, It may also be fatal within two or three days, and previous to reaction having commenced; and, 3d, It may occasion death during reaction,—a. by a recurrence of the attack; b. by inflammatory softening and infiltration of the cerebral tissue surrounding the extravasated blood; c. by the exhalation of serum; d. by inflammatory action of the membranes of the brain and subjacent cellular tissue, and of the membrane lining the ventricles. Even in more favourable circumstances, it leaves behind it debility of feeling, motion, and of the mental faculties; and a first attack is generally followed by a second or even a third.

70. *A.* The *unfavourable* symptoms are frequency or intermittence of the pulse; continuance of the symptoms for twenty-four hours, or for little more than half of this time in the *strong* apoplexy, after a judicious treatment; very profound coma, and obtuseness of the senses; involuntary discharges of the urine and feces; contraction of the pupils, or contraction of one or both pupils accompanied with spastic actions of muscles; very laborious stertorous breathing, particularly if attended with foam about the mouth, and a weak pulse; cold and profuse sweats; the occurrence of convulsions; the association of

hemiplegic symptoms with the apoplectic, and complete loss of vision. Frequent yawning or continued somnolency indicate effusion, or increasing effusion. QUARIN observes very justly, that when the patient frequently applies the hand to a determinate part of the head, or when delirium supervenes, or if partial perspirations occur early in the attack without benefit, the result is generally fatal. Complete hemiplegia, without coma, but with integrity of the mental faculties, and perfect motion and sensation of the non-affected side, is less dangerous than a more partial paralysis, with stupor or coma. When one pupil is contracted and the other dilated, the existence of unequal pressure may be inferred. It has generally been stated that complete loss of feeling and motion, accompanied with coma or stupor, is extremely dangerous. CRUVEILHIER remarks that he has seen recovery in such a case. I have met with it in two cases, one of which was seen by Dr. HOOVER.

71. Delirium is an unfavourable complication; and indicates either the escape of blood from the seat of extravasation upon the membranes which it irritates, or the occurrence of inflammation of the cerebral structure or meninges. Acceleration of the respiration, and vomiting supervening spontaneously, unless from matters occasioning the attack, are very dangerous symptoms. A similar remark is applicable to loquacity, or complete loss of speech, particularly when attended with a frequent pulse.

72. When the disease occurs in the course of insanity, or in epileptics, an unfavourable result may be generally anticipated; a nearly similar conclusion may be drawn if it seize aged persons, and broken constitutions, upon the disappearance of gout from the extremities. In the majority of cases of apoplexy proceeding from efficient causes originating in the brain, a perfect recovery is not to be expected. On this, M. PORTAL has insisted strongly; and although it is just as a general rule, many exceptions will present themselves. If the pulse sink, or intermit, or become remarkably quick; and coldness of the extremities, or cold clammy sweats come on; or the power of respiration be greatly diminished; inevitable or fast approaching dissolution may be predicted.

73. B. The favourable signs of the disease are, a moderate attack; a decline of the symptoms after treatment, and particularly if a warm, general, and gentle perspiration take place; the occurrence of discharges of blood from the nose, hæmorrhoidal vessels, or uterus; and a free state of the bowels, with consciousness of all the evacuations. The accession of the menses, of the piles, or of pyalism, have been justly viewed as the most favourable signs by HIPPOCRATES, SCHAUT, DOLÉUS, and many subsequent writers. GOAVARTS considers hæmorrhage from any part, particularly epistaxis, pyalism, a copious and general perspiration, with free alvine and urinary discharges, the most favourable signs. The accession of fever has been considered favourable by HIPPOCRATES and PORTAL; but many experienced authors do not agree with them. I believe that, although some may recover from this state, it indicates the accession of inflammatory action of the portion of brain or membranes adjoining the seat of hæmorrhage; which will be dangerous in respect of the extent to which it may proceed,

and the effects it may produce on the part, particularly in causing a renewal of the hæmorrhage. In all cases, the practitioner, even under favourable appearances, should give a cautious prognosis until the tenth day; the eighth being that on which an unfavourable change is apt to occur, and the extravasation to be renewed.

74. CAUSES.—The causes of apoplexy, both predisposing and exciting, have generally a direct or indirect influence upon the state of the vital energy and circulation of the brain. The manner, however, in which causes may individually influence either the vital condition or circulation varies extremely; and the action of several of them is even peculiar. Those causes, which in some cases are merely predisposing, may in others be exciting; and changes previously induced in the organisation of the brain, or in the state of its vessels, even from causes which lead to other maladies, may, either directly or indirectly, occasion apoplexy.

75. A. The predisposing causes of apoplexy.—This disease occurs most frequently in persons of the male sex, owing to their habits, and greater exposure to the exciting causes; and in the far advanced stages of life. The majority of authors state the period intervening between forty and seventy as that in which it is most common; but it is not infrequent at both earlier and later epochs, particularly the latter. M. ROCHOUX found, in 63 cases attended with extravasation of blood, that 2 were between 20 and 30 years of age, 8 from 30 to 40, 7 from 40 to 50, 10 from 50 to 60, 23 from 60 to 70, 12 from 70 to 80, and 1 from 80 to 90 years. I have met with the true hæmorrhagic apoplexy at the early age of eighteen. The hereditary tendency of the disease, as shown in several instances by FORSTUS, WEPFER, PORTAL, BLANE, FRANK, and others, cannot be doubted.

76. The form and habit of body may also predispose to the attack; but, I believe, much less frequently than is usually supposed. A large head, short neck, full chest, sanguine and plethoric constitution, and corpulency, are generally considered signs of disposition to it; but the state of the heart's action, and of the circulation through its cavities, with a plethoric state of the vascular system, has a more marked influence, as will appear in the sequel. In the 63 cases which have been minutely analysed by M. ROCHOUX, only 10 were fat and plethoric persons, 23 were thin, and 30 were of the ordinary habit of body. He therefore maintains that there is no external appearance of habit and temperament whereby the disposition to apoplexy is indicated.

77. Long and intense thought; disappointments, depressed and anxious states of mind; the habitual indulgence of the temper, passions, and appetites; the irritable and sanguine temperaments; sedentary and luxurious living; too great sexual indulgence, particularly when accompanied with full living; habits of intoxication, or the too free or constant use of wine and malt liquors; laborious employments, especially when they require the stooping posture; the suppression of accustomed hæmorrhages, discharges, or habitual diseases, particularly those which are accompanied with evacuations; and the neglect of vascular depletion after their suppression; the influence of other diseases, particularly those of

the heart, liver, lungs, kidneys, and digestive organs; a gouty diathesis; extremes of temperature, particularly when conjoined with moisture; sudden vicissitudes of temperature; frequent indulgence in sleep after a full meal; the use of neckcloths worn too closely around the neck; sleeping with too low a pillow, particularly after a meal; and lying too long in bed; are among the most common predisposing causes of apoplexy.

78. ALBERTI and SFIZ have insisted on the greater frequency of this disease amongst the *studious* than in other classes. FRANK says that the greater proportion of his apoplectic patients had been previously subject to hæmorrhoids. The use of *tobacco*, particularly in the form of snuff, has also been considered to favour the occurrence of apoplexy. As to the influence of *weather and seasons*, it may be stated, that MORGAGNI and LAECIUS observed this disease most frequently in hot weather suddenly following cold and rainy seasons. KAISER says that he met with the greatest number of cases in the months of October and November; and HIPPOCRATES, GALEN, FORESTUS, KELLIE, and others, have noticed the influence of cold in producing it. I believe that very cold weather, or cold conjoined with moisture, favours its occurrence in very old subjects; and that very hot and moist seasons occasion it in robust and plethoric persons. The influence of hot weather in its production has been insisted on by MORGAGNI and CHEYNE. The FRANKS found apoplexy most prevalent at Petersburg and Wilna during the height of summer (J. FRANK, *Prat. Med. Univ. Præcep.* t. ii. p. 308.).

79. Apoplexy seems to be as frequent in the poorest as in the richest classes; but in the former it is more commonly attended with paralysis, and oftener assumes an asthenic or *weak* character, the attack chiefly proceeding from frequent exposures to the vicissitudes of season and temperature, to severe and long-protracted exertion, and a less nutritious diet. In the latter it more generally assumes the *strong* or active form, arising most frequently from ease, luxury, and various indulgences.

80. It will be observed that nearly all these causes act by habitually favouring determination of blood to the head, or by impeding its return, and by diminishing the vital energy of the brain at the same time that they favour a plethoric state of its capillary vessels. These derangements of vital manifestation and of circulation, when frequently produced, will occasion further changes, and sometimes will, upon the occurrence even of the slightest exciting causes, terminate in those lesions which constitute the disease itself.

81. B. The exciting causes frequently act in a similar manner to the foregoing, but generally in a more sudden manner and intense degree. These are, immoderate perturbations of mind, as consternation, terror, fear, despondency, anger, disappointments, anxiety, distress of mind from losses, sorrow, violent chagrin, great joy, immoderate fits of laughter, and all painful, depressing, or exciting mental emotions and exertions. Numerous illustrations of the immediate influence of the above passions in producing the disease are to be found in the writings of ARÆTÆUS, FORESTUS, ZULIANI, PORTAL, ROUCHER, CHEYNE, COOKE, ABERCROMBIE, &c.

* 82. Intemperance in eating and drinking is amongst the most common exciting causes of the disease; and numerous instances of its immediate ill effects are adduced by the above writers, and by BONET, MORGAGNI, MEAD, FOTHERGILL, and others. Oppletion and distension of the stomach prevent the descent of the diaphragm, impede the dilatation of the cavities of the heart, obstruct the circulation through the lungs and the return of blood from the head, whilst the vital energy is abstracted from the brain, and determined to the digestive organs, in order to dispose of the load by which they are oppressed. Owing to this procession of phenomena the vessels of the encephalon are engorged at a time when their vital energies are diminished; while the rapid influx of fluid matters into the circulation as the process of digestion advances, tends to heighten the vascular fulness and disposition to effusion. Besides, habitual intemperance of this description generates a plethoric state of the system, with congestions of internal viscera. Spirituous liquors are seldom productive of apoplexy until after a continued addition to them, unless they are taken in excessive quantities; and perhaps the habit of drinking much malt liquors or wine is still more frequently a cause of the disease, than indulging in spirits, which, when they occasion apoplexy, act more upon the vital endowments of the brain, than in causing extravasation of blood; the chief changes produced by them, being serous effusion with injection of the vessels. Sir A. CARLISLE has adduced a case of apoplexy, arising from drinking an immense quantity of gin. Upon dissection, the odour of the spirits was detected in the serum effused in the ventricles of the brain.

83. Connected with the use of spirituous or fermented liquors, I may here allude to the influence of the class of *narcotics*, particularly opium, stramonium, hyoscyamus, tobacco, &c., the excessive use of which sometimes occasions all the symptoms of congestive apoplexy, and even extravasation. Of all the narcotics, the different species of monkshood most readily occasion apoplexy, when taken by mistake. I was lately consulted in the case of a young man who had incautiously chewed some seeds of this plant; he was shortly afterwards seized with a sense of numbness of the face, soon followed by complete apoplexy, as described under the third variety of the disease, from which he recovered with great difficulty, and with palsy of one side, with which he is still affected, now upwards of a twelvemonth from the time of attack.

84. Nearly allied to the operation of narcotics is that of the fumes of charcoal, and various *mephitic gases*, which, whilst they diminish, or altogether arrest the changes affected by respiration on the blood, thus occasioning asphyxia, and carus without stertorous breathing, sometimes produce all the symptoms of complete apoplexy, owing to their effects upon the vital endowment of, and circulation in, the brain. In respect of the *modus operandi* of narcotics and deleterious gases on the system, somewhat different opinions have been entertained by CULLEN, GOONWYN, CURRIE, ORFILA, BRODIE, and others who have investigated the subject. There can, however, be no doubt that they act chiefly upon the ganglial system, particularly on that part

which actuates the brain, when they produce apoplexy, destroying the influence of this system on the vessels of the encephalon, and thereby retarding the circulation in, and favouring congestion of, its capillaries, and interrupting the functions of the organ.

85. Violent straining in lifting heavy weights, or muscular exertions; straining at stool; the venereal act, particularly under unfavourable circumstances, or too frequently repeated; the metastasis of other diseases, especially of gout and rheumatism; whatever impedes the return of blood from the head, as a dependent posture of the head, or holding it long in an averted position, or looking backwards without turning the body, particularly when the neck is short; sleeping upon too full a meal, especially with a neckcloth or other ligatures around the neck; violent fits of coughing or sneezing; pregnancy and child-birth; exertion of body, with an anxious mind; stumbling; the use of the warm bath; and the sudden exposure to heat or cold; are among the most frequent exciting causes of apoplexy.

86. The effect of the sun's rays in producing what is commonly called *coup de soleil*, is well known. Many of the seizures thus occasioned amount to complete apoplexy, in some one of its forms, particularly the first and third. But other conditions of heat will also sometimes occasion an attack, as heat combined with moisture, and the exhalations from a number of persons crowded together in ill-ventilated apartments. The influence of crowded rooms and assemblies in causing apoplexy is well known, and in occasioning headach, and sense of fullness in the vessels of the encephalon, even in persons not predisposed to an apoplectic attack.

87. Cold also, particularly when applied suddenly to the surface of the body and lungs, excites the disease in aged persons, whose vital energies are already greatly impaired. The vessels of the brain in this class of subjects are weak, fragile, and liable to rupture, or to permit a portion of their serous contents to escape. Besides, cold depresses still lower the vital powers of the frame, and tends to retard the circulation, whilst it drives the blood from the surfaces into the large viscera, and particularly into the encephalon, which, from its unyielding case and exemption from atmospheric pressure externally, is more obnoxious to congestion, retarded or interrupted circulation, and compression from vascular fullness, than any other organ; occasioning lethargy in the robust or young, and apoplexy in the old or predisposed. Cases illustrative of apoplexy produced by long exposure to great cold, particularly when the disposition to sleep which it induces is yielded to; by the incautious use of the cold bath, and of ice applied to the head; and by the practice in Russia and Poland, of using a snow bath after the warm bath; have been recorded by WEPFER, WAITHER, PENADA, MACARDI, BRANDIS, KELLIE, PORTAL, and FRANK. Of about fifty perfect cases of the disease, the causes were analysed by Dr. CUEYNE, and ranked as follows: — 1st, Drunkenness and habitual indulgence in exciting liquors; 2d, The form of the body; 3d, Temperament; sanguine, sanguineo-choleric, choleric; 4th, Gluttony; 5th, Indolence; 6th, Mental anxiety; 7th, Fits

of passion; 8th, Externa heat; 9th, The use of tobacco. (*On Apoplexy and Lethargy*, p. 149.)

88. *C. Modus operandi of the above causes.* — If we endeavour to trace the relation subsisting between these causes, and what we know of their uniform effects, either upon the brain or on other parts of the body, we shall find that they tend first to excite, and afterwards to exhaust, the vital energy, and to distend the capillaries of the part. Now, as the brain is enclosed in an unyielding case, it must follow that, when the capillaries are excessively distended, the veins, which are the most yielding, will be proportionately compressed, whilst the force of the circulation in the arteries will tend to perpetuate this distension, and consequently the compression of the veins. Thus the circulation will be retarded; the portion of the ganglial system supplying the brain be likewise, to a certain extent, benumbed by the increased pressure to which it is subjected, and the functions of the organ abolished, even without extravasation having occurred. Upon dissection after death, the blood, which had distended excessively the capillaries, will be found to have passed into the veins, giving the appearances of venous congestion merely, as is uniformly observed in other parts of the frame, which have been the seat of congestion, without inflammation, — venous congestion, at least to any considerable extent, being incompatible with the physical condition of the encephalon during the life of the patient, unless it be occasioned by impeded return of blood through the sinuses and large veins, although congestion of its capillaries undoubtedly frequently exists.

89. When hæmorrhage takes place, the effused fluid will occasion more or less pressure, according to its extent; but, from the condition of the encephalon, the pressure will almost equally affect all parts of it; the blood being thereby prevented, to a certain extent, from returning by the veins, whilst the capillaries and arteries will be unnaturally distended. This state, however, will pass off after death; and venous congestion only, with extravasation, present itself. When, however, the extravasation is large, the pressure will prevent both the veins and the capillaries from receiving their due proportion of blood; whilst the ganglial system of the encephalon will be analogously, or injuriously, affected. But this topic will be pursued hereafter.

90. *D. Consecutive and complicated Apoplexy.* — An attack of apoplexy may be caused by other diseases, in various stages and states of their progress. It may occur after the pre-existing disease has disappeared, and in consequence of its disappearance, as in the case of suppressed hæmorrhages, particularly epistaxis and hæmorrhoids; or suppressed evacuations and eruptions, as those from the uterus, bowels, &c.; or it may supervene in such a way as will lead us to infer that its occurrence has been the cause of the disappearance of the pre-existing malady, as in cases of misplaced or metastatic gout, rheumatism, &c.; or it may likewise appear in the course of other diseases which it cannot thus displace, and assume the character of a most serious or fatal complication. The importance of these morbid relations of apoplexy requires for them a more particular notice than they have generally obtained.

91. *a. Consecutive.*—The supervention of apoplexy after suppressed hemorrhages, evacuations, and eruptions, has been satisfactorily noticed by many writers; and seems to proceed from unusual fulness of the vascular system, owing to the suppression, and the accidental co-operation of causes which determine the blood to the head, and favour its extravasation. Besides the suppressed evacuations, noticed above (§90.) as being influential in causing an attack, I may mention the sudden healing up of chronic ulcers; the arrest of habitual perspiration from the feet; unusual continence; and suppression of the lochia or of leucorrhœa. It is not infrequently observed after suppressed otorrhœa; and from inflammation of the ear having extended to the membranes and substance of the brain, and produced abscess. I have met with several cases of this description in which the apoplectic state was complete, and attended with hemiplegia. Numerous instances are also recorded by LALLEMAND, GENDRIN, LARD, and other writers. (See BRAIN, *Abscess in.*)

92. *b. Metastatic.*—The occurrence of the disease, from misplaced or metastatic gout, has been noticed by MORGAGNI, WEICKARD, MUGRAVE, JUNCHE, TODE, HAGENDOORN, CONRADI, and CHEYNE. The last named author thinks that the symptoms differ, when occurring from this cause, from those which constitute true apoplexy. I believe, however, that they differ in no respect, in general, from those which characterise congestive apoplexy; and that, as hemorrhage within the head does not commonly constitute the attack of apoplexy from this cause, hemiplegia or paralytic symptoms seldom accompany it.*

93. Nearly similar seizures to the foregoing will occur from attacks, or metastases, of *rheumatism* to the membranes of the brain. The apoplectic symptoms are, however, seldom so fully developed as in other cases, a comatose state being the more usual result. On dissections of fatal cases of this description, MORGAGNI, HOFFMANN, PLENCIZ, RANOF, WEICKARD, and STOLL, found the membranes injected, thickened, and with serum interposed. Very nearly similar symptoms and appearances within the head result from *erysipelas* extending to the membranes of the encephalon. Here, as well as in the rheumatic disease of the same structures, the apoplectic state is not so strongly marked as in its more idiopathic forms; and paralysis rarely occurs, excepting in the advanced progress of the cerebral disease.

94. *c. Complications.*—Apoplexy occasionally supervenes in the course of many diseases, even at the commencement of some of them, and becomes associated with them. It is sometimes an

attendant upon the *cold stage*, or the period of invasion, in *fevers*, particularly those which proceed from concentrated marsh effluvia, and from the infection of animal miasms. The epidemic prevalence of apoplexy, noticed by BAGLIVI, LANCISI, MORGAGNI, FORMEY, and STOLL, may be explained by a reference to this connection; although the observations of the FRANKS and CHEYNE, which are conclusive of the great frequency of the disease in hot and moist seasons, seem to countenance the opinion of these authors. When apoplectic seizures usher in fevers, whether paludal or infectious, the attack is seldom accompanied or followed by paralysis. In a case, however, of perfectly formed apoplexy ushering in a case of endemic fever of a warm climate, which occurred in my practice, paralysis supervened upon the seizure. An attack of true apoplexy may also occur in the stages of depression and collapse of adynamic and typhoid fevers, particularly in the former stage: in the latter, coma is generally present, but it very rarely amounts to the true apoplectic state; and when it does, hemiplegia generally attends it.

95. The occurrence of apoplexy after *epileptic* convulsions, the convulsions and eclampsia of the puerperal state, and, more rarely, during the hysterical fit, is well known. It may even take place during the pains of labour, without previous convulsion, and in the latter months of pregnancy. In these cases the attack offers nothing to distinguish it from the first, second, or third varieties described above. It is not infrequent termination of inflammation of the brain, or of its membranes. Indeed, there seems every reason to suppose that acute inflammation of that part of the cerebral structure in which hemorrhage takes place, not infrequently precedes the extravasation. It also occasionally supervenes upon *mania*, and the various states of *insanity*, particularly in its fourth or last noticed form (§. 43.). It also occasionally arises from interrupted circulation through the *lungs*,—a fact well demonstrated by BONET, BANG, HUXHAM, J. FRANK, and CHEYNE. Its occurrence during the advanced stages of both acute and chronic diseases of the *air-passages* and *lungs*, particularly those characterised by violent attacks of cough, has also been observed by myself, most frequently in *hooping-cough*, *bronchitis*, *asthma*, and *emphysema* of the lungs.

96. The connection which sometimes subsists between apoplexy and organic disease of the heart, especially hypertrophy of the left ventricle, has been remarked by VALSALVA, MORGAGNI, LIEUTAUD, TESTA, PORTAL, CHEYNE, RICHERAND, BRIIN, and HOPE; and has been viewed by them in the light of cause and effect, the apoplectic seizure arising from the cardiac disease. CORVISART and ROCHOUX, physicians of large experience, have thrown doubts upon the nature of this connection; have likewise denied the frequency of its occurrence; and have viewed these diseases as sometimes consecutive in their origin, although co-existent in their advanced state, but without the relation of cause and effect: thus considering the occurrence of apoplexy or paralysis in the advanced stages of disease of the heart as entirely an accidental coincidence. But when such a complication of morbid states is frequent, prominent, and observes the same

* Some years since I was called to a medical friend in Westminster, who, after complaining of symptoms of indigestion, was suddenly seized with complete apoplexy, with stertorous breathing, but with no signs of paralysis, for which the usual means were promptly and decidedly employed. On the following day a complete attack of gout in both feet took place, with disappearance of the cerebral disease. Warmth to the feet, and aperients, were prescribed; but from his eagerness to rid himself of the pain, and to visit his patients, he took, contrary to the advice given him, a large dose of calicheum. A few minutes afterwards the gout left his feet, and seized his stomach; whence it was with difficulty recalled to the extremities. This was the first time he had ever been seized with gout, and the first part it attacked was the brain. In a complete form of apoplexy as can be concluded, Metastasis of gout to the head may also occur of the brain, with coma, or lethargy.

succession, a more intimate connection than mere sequence or coincidence ought not to be entirely rejected, particularly when admitting of a rational explanation. The frequency of apoplexy or paralysis, and the general presence of the latter when the former occurs in the advanced progress of cardiac disease, especially hypertrophy of the left side of the heart, have led me to believe that more than mere coincidence actually exists. It is, however, by no means improbable that the disposition to organic change throughout the whole vascular system, sometimes associated with disease of the heart, may so far exist in the delicate vessels of the brain, as to favour the occurrence of hæmorrhage from them when the action or impulse of the heart is increased by disease or the influence of passion or emotion; or when the return of blood from the head is impeded by congestion, or interrupted circulation through the lungs or right side of the heart.

97. The association of apoplexy and hepatic disorder has been noticed by STOLÉ, BALDINGER, MOLL, CHEYNE, and others. The circumstance of icteric patients frequently being cut off by apoplexy marks the connection. I have met with several cases in which both apoplexy and paralysis have supervened to, and become complicated with, hepatitis, both acute and chronic, particularly the latter. The liver is seldom diseased without disordering the functions of the brain; and I believe that accumulations of vitiated bile in the gall-bladder and hepatic ducts, independently of any actual disease of the liver, will predispose to the apoplectic seizure. I am the more confirmed in these opinions by having observed disease of the biliary apparatus in a very large proportion of those who had died of apoplexy or paralysis; and, in many of those who have recovered, the active use of purgatives had produced morbid evacuations, containing a large quantity of blackish green, greenish, or yellowish brown bile, before much amendment had taken place. It may, however, be conceded that serious disturbance of the brain equally induces disorder of the liver; and that the latter may have been occasioned by the former. But this merely proves the frequency and intimacy of the association. It should also be kept in recollection that the apoplectic seizure generally masks the hepatic affection; the practitioner should, therefore, examine the region of the liver, where, as well as at the epigastrium, fulness, and, in some cases, the existence of tenderness, may be detected; and, as the consciousness of the patient returns, the hepatic disorder will occasionally become more manifest. This complication is so important and frequent, that it ought always to be looked for in practice; for many of the causes which occasion hepatic disorder also give rise to cerebral disease; and the production of either the one or the other singly, often favours the appearance of the other subsequently. I have no doubt, however, that an inflamed or actively congested state of the substance of the liver has a very marked effect in exciting that state of the capillary circulation of the brain on which the apoplectic seizure has been shown to depend (§ 86.).

98. The influence of gastric disorder in producing apoplexy, not merely as evinced by intoxication, a surfeit, &c., but also by some one or more of the several ailments which charac-

terise impeded or otherwise disordered function of the stomach and intestines, has been noticed by SCHENCK, SCHROEDER, WEICKARD, MEZLER, FOTHERGILL, SCHÆFFER, THULENIUS, HUFELAND, LOUYER VILLERMAZ, and CHOMEL; and more strongly insisted on by BROUSSAIS and his followers. Although the general dependence of the latter on the former has been too absolutely contended for by BROUSSAIS, the occasional connection cannot be doubted. Indeed, in several of those cases wherein the association with hepatic disorder is observed, gastric and intestinal disturbance is also evinced. But however complicated, whether with either gastric or hepatic disorders only, or with both conjoined, apoplexy is, perhaps, as often the concurrent result of the same causes that produced these disorders, as a disease springing from and dependent upon them. The fact ought not to be overlooked, that the vital manifestations of the stomach, liver, and brain, although different, are yet actuated by the same system of nerves—the ganglial; and that, notwithstanding the individual parts of this system seem to perform modified offices, yet the healthy condition of the one is necessary to the perfect functions of the rest; and, consequently, a morbid state of one considerable portion of the ~~nerves~~ will necessarily, sooner or later, be followed by derangement throughout,—causes which operate upon one part of the circle, thus having their effects extended to other parts remote from the seat of primary impression. It should not, however, be overlooked, that a large number of instances of gastric affection, retching, &c. accompanying the apoplectic seizure, proceeds from the sympathetic effect produced upon the stomach by the severe injury or shock sustained by the brain.

99. The occurrence of apoplexy either after, or during attacks of *colica pictorum*, has been noticed by HAGENDOORN and CHEYNE. Although palsy is the common consequence and state of complication, yet apoplexy, with or without paralysis, particularly the former, is sometimes met with. An instance occurred to me some time since of a patient having died of apoplexy during an attack of this disease. The *constipated* state of the bowels to which persons affected with cerebral disease are liable, when neglected, or not readily yielding to medicine, will sometimes favour the occurrence of the apoplectic attack.

100. The association of apoplexy with *disease of the kidneys* has been noticed by several writers, particularly BONET, LITTRE, MORGAGNI, and BRIGHT. The occurrence of apoplexy, particularly serous apoplexy, after suppression of urine, is not uncommon. By some writers, however, the suppression has been imputed to pre-existing disease of the brain. But this is a supposition merely: for, in the great majority of cases, the kidneys and ureters offer evidence of having been the parts primarily affected. The experience of BONET and MORGAGNI, and of numerous later writers, fully support this conclusion. Besides, the cerebral nervous system can only indirectly influence the urinary secretion. That apoplexy, coma, or lethargy, should occur when the urinary secretion is suppressed, and the vascular system overloaded, may be readily imagined. The occurrence of the disease, as a consequence of organic change in the secreting structure of the kidneys, whereby their functions are more or less a-

structed, has been illustrated by the cases recorded by Dr. BRIGHT.

101. The sudden or more gradual supervention of apoplexy after the slow development of many of the organic changes which are described in the article on the Pathology of the Brain, — in some cases even when little cerebral disorder had previously been complained of ; in others when more violent and even paralytic symptoms had occurred, has already been noticed (§ 45—48.), and has also received due attention in the article on Palsy.

102. THE PATHOLOGICAL STATES CONSTITUTING APOPLEXY have been in part comprised in the observations offered on the principal kinds of apoplectic seizure, and on the *modus operandi* of the remote causes (§ 88.). There can be no doubt that much misapprehension has existed on this subject, and consequently that the treatment adopted has been frequently either nugatory or injurious. The opinion, that the disease depends upon compression solely, has been too generally adopted, without considering the relation in which such compression, granting its existence, stands in to the causes which occasioned it, and the symptoms it produces. The idea that compression is indispensable to the existence of the disease has thus been empirically assumed, and acted upon in practice. A careful consideration, however, of the morbid appearances on dissection, in relation to the symptoms, and to analogous changes and their phenomena, have led me to infer that compression of the brain never can take place ; that pressure exists in the great majority of cases, but even that it is not indispensable to the apoplectic state ; and that, although retarded circulation, whether caused by pressure or by any other state, seems very frequently to obtain, it does not constitute the only morbid condition of the brain in apoplexy, — or, in other words, that apoplexy is not merely a disease of the vessels of the brain, although these vessels are either consecutively or coetaneously affected. It should not, however, be overlooked, that even those who argue for compression being the cause, do not thereby imply, as their opponents would make it appear, that the tissue of the brain is actually compressible, but contend for the effects which pressure undoubtedly produces upon living and sensible parts. Therefore, although the brain is not compressible, it does not follow that it may not be affected by pressure, even independently of the obvious effects which pressure must produce on its vessels and the circulation through them.

103. Before entering further on this subject, it will be necessary to premise, that the circulation of the brain, like that of other important organs, is chiefly under the dominion of that portion of the ganglial system of nerves which is ramified on the blood-vessels, and is distributed otherwise to the organ itself ; and that an exhausted or morbidly depressed state of the influence those nerves exert on the circulation and manifestations of the brain, with the consequent effect this state has upon the capillaries, particularly in dilating or congesting them, and disposing to their rupture, is the principal cause of, and often constitutes, the apoplectic seizure, — whether this influence emanate from their chief centres, or from local sources provided for the peculiar offices of the organ, as the small and primary glands.

104. From this it may be inferred, that the proximate cause of a large proportion of the cases of apoplexy, not omitting even those which are attended with retarded circulation and hæmorrhage, is here imputed primarily to the condition of that part of the ganglial system which supplies the blood-vessels of the brain and the brain itself. That this actually is the case, is shown by the nature and mode of operation of the remote causes of the disease ; by the frequent affection of the functions of the brain previous to an attack ; by the nature of the principal part of the phenomena accompanying the attack ; by the disorders observed subsequently, when partial recovery takes place ; by the tendency to relapse ; and by the morbid appearances which present themselves on the dissection of fatal cases.

105. It is obvious, that the appearances in these cases are merely ultimate lesions, as in all fatal cases of organic disease, and some of them even post mortem changes ; and yet, although the most advanced in the progression of morbid phenomena, they are often of themselves obviously insufficient to occasion death. Leaving out of question those cases which are unattended with extravasation, the venous congestions, even admitting their existence, or the serous effusion, formed in the other cases, are seldom such as to account of themselves for the event : inasmuch as they are frequently observed to an equal, or even greater, extent in cases where neither apoplectic nor comatose symptoms had preceded death ; and are, as I have already shown (§ 88.), the result of the accumulation in the veins, after death, of the blood which had distended the arterial capillaries during life, and thus had been instrumental in abolishing the cerebral functions.

106. The circumstance of the morbid changes being insufficient to account for the result, had induced various writers, particularly KORTUM, ZULIANT-SCHYLLER, SCHAEFFER, and HUFFLAND, to consider apoplexy frequently to proceed from the state of the nervous power, which they considered defective ; and led WILCKAND to contend that it seldom depends upon compression. Dr. ANFRENCHOFF, evidently influenced by the above considerations, refers the disease to interrupted circulation in the vessels of the brain, owing to pressure from the effused blood, or to other causes. It is extremely probable that a retarded, if not an interrupted, state of the circulation very generally obtains ; and that, partly in consequence, the sensitive and motile powers are not generated. This, however, is only a matter of inference ; for we have no evidence that complete interruption of the circulation of an organ or part can exist for any time, and its functions be so rapidly restored, as is sometimes observed in apoplectic seizures, or without gangrenous disorganisation being sometimes the result ; and even if we admit this state of the circulation, we must still refer it to some antecedent and more general morbid condition.

107. I had a congested state of the vessels and retarded circulation of the brain should, however, exist, owing to the diminished, or exhausted, or suppressed state of that influence which undoubtedly actuates the vessels, may readily be corrected ; but that, even in the brain, the effusion of a small portion of blood should occasion pressure sufficient to interrupt the circulation through it, requires

further proof. It seems more probable, and consonant with facts observed in other parts of the body, that, in cases where the extent of effusion or external injury warrant the admission of pressure, this state gives rise to the apoplectic seizure, as much from the effects it produces upon the ganglial apparatus of the encephalon as from interrupted circulation through its vessels.

108. THE PATHOLOGICAL CONDITION OF THE BRAIN, therefore, in apoplexies, may be stated to be as follows:—*a.* That the tissue of the brain is not sensibly compressible; but, being lodged in an unyielding case, it may be injuriously affected by pressure, chiefly by displacing the contents of its blood vessels, altering the healthy relative proportion of their contents in each of the series of vessels, and impeding the circulation through a part or the whole of the organ: and that pressure exerted in one part, whether from distended vessels, extravasated blood, or the development of tumours, when reaching a certain pitch, will almost equally affect the whole of the organ, particularly when the pressure is great: the yielding nature of the cerebral structure, as well as the unyielding case in which it is placed, must necessarily give rise to this result.

109. *b.* The various states of vascular impulse and action, impeded circulation in the veins and sinuses of the brain, and distension of its capillaries, whether arising from the influence of the organic nerves on the blood vessels, or from morbidly increased action, or from obstruction in the large vessels, the lungs, or the right side of the heart, will, either individually or in partial conjunction, occasion the above effects, owing chiefly to the unyielding walls of the encephalon.

110. *c.* Owing also to this physical condition of the brain, the pressure of the atmosphere, which influences the venous circulation of all other parts of the body, cannot modify, in a direct or sensible manner, that of the brain: and hence the cranial cavity must always contain nearly the same quantity of blood during life, the differences which occur being chiefly those of rapidity of circulation, and of relative proportion in each part of the series of vessels; an increased quantity in the capillaries thus causing a proportionate diminution in the veins. Owing likewise to this condition, the forcible injection and distension of one set of vessels will necessarily diminish the capacity of, and obstruct the circulation through, the other; and that part of the series which is nearest to the propelling power—the first to receive the impulse of the heart, and the nearest capable of being much distended by it—will, from relative situation, overcome the distension, and diminish the capacity of that beyond it. Thus the arterial capillaries of the brain will be the first distended from increased action of the heart and large arteries, and, by their distension, will soon overcome that of the veins, if it have previously existed; and hence, by compressing them, impede the circulation through them.

111. The frequent inflammatory character of apoplexy, or the common occurrence of reaction, will be readily accounted for from what has now been stated; for, whether the attack commences with dilatation or increased action of the arterial capillaries, or with exhaustion or deficiency of their vital power, or with retardation of the circulation through the veins and venous capillaries, the result will gene-

rally be augmented action of the arteries going to the brain, extending itself in some measure to the heart, and this state will continue until the abolition of the cerebral functions shall have impaired, or altogether destroyed, the heart's action.

112. *d.* Upon tracing the relation subsisting between the various causes of the disease, the symptoms, and the appearances on dissection—upon remarking, as far as my own observation has gone, the frequency of change in the pineal and pituitary glands of apoplectic patients, I am induced to infer that functional lesion, or organic change, often commences in that portion of the ganglial system which supplies the encephalon and its blood vessels; and that, owing to exhaustion of its influence, the capillaries lose their vital tone, have their circulating functions impaired, become more or less dilated, and are disposed to rupture.

113. *e.* When apoplexy proceeds from causes of an obviously exciting nature, or from sur-action of the heart and arteries, it seldom occurs until a certain degree of exhaustion of the vital tone of the capillaries has taken place, whereby they become dilated and congested, so as either to press the encephalon against its unyielding case, and, owing to the pressure, impede the return of blood by the veins (§ 109, 110.), or to give rise to extravasation, which, when considerable, has a similar effect; injection of the arteries of the brain and its membranes resulting equally from both, owing to the obstructed circulation through the veins.

114. *f.* Where pressure unequivocally exists, it may also benumb or suppress the vital influence of that part of the ganglial system which supplies the encephalon, thereby heightening the effect produced both on the organ itself and on its circulation.

115. *g.* There are cases of apoplexy generally presenting the phenomena, which have given rise to the appellation of *weak apoplexy*, which, occurring from depressing causes, operating upon exhausted states of the encephalon and frame generally, directly suppress or abolish the vital influence of the organic or ganglial nerves of the brain, and consequently the cerebral functions, without producing further change of its vascular system, than retarded circulation to so slight a degree, as not to amount to great distension and compression, and without occasioning extravasation of blood, although extravasation often does supervene to this state, giving rise to pressure and its consequences, so as to heighten or prolong the primary lesion, and to occasion paralysis.

116. *h.* In cases proceeding from depressing causes, acting on a plethoric habit of body, the effect is also more or less directly produced on the organic nerves of the brain, whereby the capillaries lose their tone, are congested and dilated, or ultimately ruptured, and the return of blood by the veins retarded, whilst the smaller arteries and capillaries are more and more engorged by the impetus of the blood in the large arteries, the pressure thereby occasioned suppressing the cerebral functions as in the other cases.

117. *i.* When the disease proceeds primarily from impeded return of the blood from the head, the congestion only commences in the veins; but, as the action of the heart and arteries con-

tinues, the capillaries are soon afterwards injected & dilated; and, in proportion as they enlarge from the distending power to which they are more immediately subject, the veins are compressed, owing to the physical condition of the brain, more or less emptied, and admit of the greater dilatation of the capillaries, some one or more of which may be even ruptured from the increased action and distension.

118. *k.* In cases accompanied with *hæmorrhage*, and consequent laceration of the cerebral structure, the deprivation of function may be as much an effect of suppression of the vital influence of the organ, owing to the shock produced by the injury, as of pressure upon the veins, and consequent injection of the arterial capillaries. In cases of this description, the state described above (§ 112. *d.*) may exist, and be followed by *hæmorrhage* and laceration of the part in which it occurs, producing the abolition of the cerebral function, great vital depression, sickness, and other signs of dangerous injury sustained by a vital organ. The pressure occasioned by the *hæmorrhage* will be followed by obstructed circulation, and, under favourable circumstances, by increased action of the arteries and heart to overcome it.

119. *l.* In apoplexy presenting on dissection *congestion* and serous effusion, these states may be often considered rather in the light of *post mortem* changes than the pathological states which had existed previously to death: it may even be presumed that the distension and congestion of the capillaries, chiefly the arterial capillaries of the organ, had overpowered its functions; and that, as in other parts, when the injection of the blood into them no longer is continued, and the distending cause has ceased to exist, they have gradually discharged their contents into the veins, which now had space given them for dilatation, owing to the emptying of the capillaries; and thus the blood has passed into the veins soon after death.

120. *m.* *Hæmorrhage* in the brain may result from the following states:—*a.* Exhausted vital energy of the ganglial organic nerves supplying the vessels and organ favouring their distension and rupture: *β.* Diseased state of the coats of the vessels themselves: *γ.* Organic change of the cerebral structure, extending to, or influencing the state of, the vessels ramified in it: *δ.* Increased impetus of blood from augmented action of the heart and larger arteries, combined with either of the other states: *e.* Impeded return of the blood from the head, similarly associated.

121. *n.* The vital energy of the organ, resulting chiefly from the mutual influence of the ganglial & vascular systems, may be so far affected as to occasion the attack with all the organic changes observed in fatal cases; and sometimes in such a manner as to constitute the disease, even without these changes having taken place; although they are most frequently produced, thereby heightening the primary lesion.

122. *o.* As corollaries from the foregoing, I infer that apoplexy often originates in exhausted or suppressed influence of the ganglial apparatus of the encephalon, with a congested state of its arterial capillaries, or impaired condition of their circulating functions, and still more frequently in extravasation of blood, either or all of which changes must necessarily exist to the extent of

suppressing the functions of the organ; and that, as apoplexy does not uniformly depend upon the same pathological state of the nervous influence and circulation of the brain, particularly in respect of the kind or degree of vital depression and vascular reaction, a due regard ought therefore to be had to the nature of the change in each case, as far as it may be ascertained, and a treatment strictly appropriated to it adopted.

123. *TREATMENT.*—The treatment of apoplexy has long furnished subjects for discussion, not only as respects the more subordinate means of cure, but also as regards the most energetic measures, and the intentions with which they should be employed. This is evidently owing to the difference which has been long acknowledged to exist in the pathological states constituting the disease, but which has recently been questioned. Without recurring to the changes so fully described above, I may remark, that a person is seized with apoplexy, and, instead of being blooded, is treated with stimulants and restoratives, and yet he recovers without paralysis having supervened. Another person is blooded largely, and he recovers. A third is treated in a similar manner, and he becomes hemiplegic in the course of the attack; and a fourth is also blooded, and he dies. Now these are very common occurrences, and point to very important considerations, which I will pursue a little further. A thin, spare, and debilitated man staggers as he walks, and falls down in the street, with pale countenance, feeble pulse, and laborious or slightly, tedious breathing. He is blooded by the nearest medical man almost immediately, and recovers. A large man, of a full habit and lax fibre, suddenly becomes apoplectic, and is instantly treated with stimulants, and volatile substances held to the nostrils, and his consciousness and voluntary motion are restored in a few minutes. One practitioner of large experience states, that he never draws blood from a patient in apoplexy, excepting under peculiar circumstances, and avers that he is more successful in his treatment than those who do. Another considers that when one full blood-letting fails of giving relief, no benefit will be derived from pushing it further, but much risk of giving rise to paralysis. A third physician, equally eminent and experienced, confides in blood-letting almost solely, and carries it often to a great amount; and a fourth, whilst he discards depletion, trusts to stimulants chiefly.

124. But if we examine into their success, we shall find, perhaps, that some difference as to degree may exist; and that, whilst many patients seem benefited, others experience no relief, if they be not even actually injured, by the kind of practice thus exclusively adopted. There is, however, one part of the treatment which is more or less adopted by all: this is the use of purgatives; which, when judiciously administered, are the most generally applicable and beneficial of all the means usually advised. Were it possible to ascertain during life the exact pathological condition obtaining in the various cases of apoplexy, and to convey a correct description of the signs by which each may be known, then the basis for a rational method of cure could be firmly laid: but the skilful practitioner is guided in the treatment he adopts by considerations, circumstances, and appearances, which scarcely admit of de-

scription; and all attempts to impart his knowledge comes far short of his wishes.

125. The method of cure in apoplexy necessarily divides itself into:—1st, That which is required when an attack is threatened, in order to prevent it,—or the prophylactic treatment; 2d, The means which are to be adopted when the disease is developed; and, 3d, The plan which should be subsequently pursued, with the view of perfecting recovery, and preventing a return of the disease,—or the consecutive treatment.

126. *A. THE TREATMENT WHICH MAY BE EMPLOYED TO PREVENT AN ATTACK WHEN IT IS THREATENED.*—It is difficult to state the means which may be resorted to with this view, as they ought to be directed with strict reference to the circumstances of the case; which are almost always different, and, not infrequently, even opposite. A strict regard must necessarily be had to the habits, age, and constitution of the patient; the predisposing and exciting causes; and the evidences of previous ailment or existing disorder in remote but related organs. The character of the countenance; the pulse, particularly in the carotids; the temperature of the head; the state of the abdominal functions, secretions, and discharges, must be our chief guides. It should not be overlooked in this stage, any more than when the disease is fully formed, that it may result from nearly opposite states of the vascular action of the brain, and of the circulating system generally; that, although the majority of cases are attended with that appearance of countenance, and action of the arteries, which warrant the inference of existing congestion, retarded circulation, or even increased vascular action in the brain,—there are others, in which the external characters of the head, the face, and action of the carotids, would lead us to infer, either that the vital energy of the organ is so far depressed as to give rise of itself to abolition of the cerebral functions, or that the extravasation of blood and laceration of the structure of the organ has occasioned such a shock to its vitality as to be followed by the same effect on its functions; vascular reaction sometimes supervening in either case, and thus imparting to the attack similar characters to those possessed by seizures which originate in, or are, from their commencement, attended with, vascular turbulence or increased action.

127. In the premonitory state of the disease, it scarcely can be admitted that extravasation or its consequences have occurred, unless in those cases preceded by paralysis; but the signs of incipient congestion, or increased action, are frequently present; whilst also, in many other cases, the symptoms of exhausted or depressed vital power are manifest; this latter state being more frequently antecedent to congestion of the capillaries than is generally supposed, although the fully formed disease may evince inordinate action, with all its usual consequences. Even in the early stage of an attack, this state of the vital power of the organ will often constitute so important a part of the disease, and will yet be attended only by simple congestion and retardation of the circulation, that the use of stimulants may then be beneficially resorted to; whilst soon afterwards, when reaction has supervened, they would no longer be admissible, large depletions, &c. being then required.

128. We should, therefore, endeavour to interpret correctly the origin of the premonitory symptoms, and prescribe accordingly. If the countenance is full or flushed, the eyes prominent or suffused, the pulse of the carotids full or strong; or even if, with this state of the countenance, they are natural; *blood-letting*, general or local, but preferably cupping on the nape of the neck, should be prescribed. If these symptoms have come on after the disappearance of hæmorrhages and discharges, this treatment is still more imperatively required, and should be directed to the restoration of the pre-existing disorder, assisted by other means, such as irritating purgatives, *revulsants*, and external derivatives.

129. When, on the other hand, the action of the carotids is weaker than natural, the countenance sunk, and the head cool, &c., opposite measures are called for: *restoratives*, antispasmodics, and stimulants are here of service, but their use requires caution; for if the pulse in the carotids is full, or strong, or at all above the natural standard, although the countenance be sunk or pale, and if the attack threatens to commence with paralysis, stimulants given internally, or even the outward use of them, as volatile substances held to the nostrils, would be hurtful. In such cases, blood-letting must be resorted to; and a *purgative* of quick operation, assisted by enemata, exhibited.

130. There are few cases, presenting even the premonitory signs of an attack, that will not be benefited by a judicious use of *purgatives*, particularly such as are suited to existing disorder of the digestive and biliary organs. In those cases which evince a disposition to vascular excitement of the brain,—where the premonitory signs are accompanied with plethora, heat of the head, injection of the conjunctiva, and flushed countenance,—after depletions and purgatives have been resorted to, the tartrate of antimony, or *James's powder*, given in moderate doses, and combined with saline medicines, so as to act gently upon the skin or the bowels, and continued for some time, has always appeared to me productive of advantage: but it is only in such cases that antimony is useful as a prophylactic; where, also, *digitalis* may be given with the view of lowering the action; but its use in these cases requires great caution.

131. When the incipient symptoms present much of the character of vital exhaustion of the brain, the combination of purgatives with gentle *stimuli* and *vegetable tonics* and stomachics has proved the most successful in my practice. If the symptoms appear after the suppression of hæmorrhoids, *æloetic* cathartics, or the extract of *colocynth*, combined with *calomel*, are amongst the best that can be employed; as they tend to induce, by their action on the rectum, a return of the hæmorrhoidal affection.

132. In threatened apoplexy from congestion and impeded circulation through the lungs, heart, or liver, local blood-lettings and purgatives are necessary. In cases characterised by a combination of either of these states with exhaustion or debility, the abstraction of a small quantity of blood by cupping, and afterwards dry-cupping, issues, or blisters, are sometimes very serviceable.

133. The insertion of setons or issues in the

nape of the neck, or the use of the tartar emetic ointment; and, in very urgent cases, large issues in the scalp of the occiput, particularly when the precursory symptoms evince a paralytic character; cold-sponging the head night and morning, or the shower-bath, with a free state of the alvine secretions and excretions, especially where there is a disposition to congestion, or increased action in the brain, and after blood-letting has been employed; stimulating or irritating pediluvia, or a blister applied to the nape of the neck, and kept open for some time, in similar cases and preceded by the same measures, constitute important items of the preservative treatment.

134. The patient ought carefully to avoid all the predisposing and exciting causes of the disease (§ 77—87.), particularly crowded apartments, the application of cold to the feet, and violent mental emotions. He ought to sleep with his head and shoulders somewhat elevated; and rise early in the morning. The diet should receive particular attention: it ought to be spare in all cases accompanied with plethoria; but not too low, when this state of the vascular system does not exist, and when the vital energies of the brain are already depressed or exhausted. It should, in these latter, be of moderate quantity, and digestible. In all cases, tranquillity of mind and body ought to be carefully preserved; and stimulating beverages avoided, with very few exceptions, which are to be made in favour of those only who present great cerebral and constitutional exhaustion. The beverages for these should be gently strengthening, but not heating, and used in moderation.

135. *B. THE TREATMENT OF THE APOPLECTIC ATTACK.*—The patient should be carried into a well-ventilated and spacious apartment, and placed with his head and shoulders very considerably raised, or in a sitting or semi-recumbent posture, with every thing removed from his neck. Directions should also be given to have hot water in readiness. His countenance, state of the eyes and pupils, the degree of fulness, flushing, or pallor of his face, the temperature of his head, state of the pulse in the carotids, and condition of his limbs in respect of sensibility, capability of motion upon their being pinched, &c. ought to be carefully examined; and, according to the evidence thus obtained as to the state of internal lesion, the propriety of depletion, and the extent to which it is to be carried, should be promptly decided on.

136. *a. Treatment of apoplexy unattended by depression of vascular action, or by marked exhaustion of vital power.*—If the pulse be strong, or full, and especially if the countenance be flushed, livid, and tumid, *general blood-letting* to a large extent, or according to its effect, is to be instantly employed. Much discussion has taken place as to the propriety of opening a vein of the paralysed or non-paralysed side, when paralysis accompanies the attack. ARRETEU, VALSALVA, MORGAGNI, and CULLEN advise it to be performed in the sound side, whilst BAGLIVI prefers the other: this is, however, a matter of little importance.

137. The next points are the *extent* to which blood-letting may be carried, and *how far* certain states of the frame and pulse warrant the practice. In robust, plethoric, and full-living persons,

particularly when the attack has proceeded from exciting causes, and paralysis is not present, thirty or forty ounces may be abstracted at once; and the operation may be performed a second or even third time to a somewhat less extent. When, however, the habit of body is spare, the person far advanced in life, the pulse not full or strong, or little fuller than natural, the heat of the head not increased, and the countenance neither full nor flushed, we must be cautious not to carry it too far. In cases of this kind, *local depletions*, particularly *cupping* between the shoulders, or on the occiput, and leeches to the neck and behind the ears, seem preferable. Age is no reason against venesection, if the symptoms indicate its propriety; but very old age, even when the operation is otherwise indicated, is a strong reason for great caution in its performance. In aged persons, local depletions are more serviceable; but even these, employed either indiscriminately or too largely, may occasion a very dangerous, or even fatal, collapse.

138. An *intermitting* or *irregular* pulse has very justly led practitioners to hesitate as to the employment of blood-letting. But a single symptom is not to guide us in the use of this, or any other remedy. If, conjoined to either of these states, there be slowness or fulness of pulse, stertorous or strong breathing, constitutional vigour and fullness of habit, tumid, flushed, or livid countenance, blood-letting, even to a very considerable extent—either general or local, or both—may be practised; but when, with irregularity and intermission, the pulse is also small, weak, or quick, the countenance pale, the temperature of the head either not increased, or somewhat depressed, and the respiration weak rather than strong, blood-letting would be highly injurious: a very opposite treatment is then called for.

139. In cases where it is a matter of doubt whether or not general blood-letting should be carried further, or be adopted at all, *local blood-letting*, to an extent which circumstances will point out, may generally be still employed, and often with great advantage. Vascular depletion being indicated in one form or other, the *situation* in which it should be performed next remains to be considered. The temporal artery has been recommended to be opened by some: others advise the jugular vein. When the disease arises from congestion, and when the face is livid, the attack strong, and the operator expert, the jugular vein may be opened, as sanctioned by VALSALVA, MORGAGNI, HESTER, FRIEND, LANCISI, STOLL, BURSARI, and PORTAL. But undue pressure of the vein, either before or after the operation, must be avoided. Bleeding from the feet, they being plunged in warm water, has been very generally prescribed by Continental physicians; and, in those cases which have occurred after the disappearance or retention of hæmorrhages and periodical discharges, or from metastasis, the practice is very judicious.

140. *Local depletions* in this disease are usually directed on the temples, nape of the neck, or between the shoulders. I prefer the latter situation, as well as cupping, to the use of leeches,—the former being much quicker and more decided in its operation. HIPPOCRATES, ARRETEU, and MORGAGNI advised cupping to be performed on the occiput: and I unequivocally agree in the

practice. If leeches are applied, the neck, occiput, and behind the ears, are the best situations. LANCISI and CRUVEILLIER advise them to the inside of the nostrils, after general blood-letting, particularly in apoplexy preceded by opistaxis; and WALTHER (*De Apop.*, p. 88.), to the veins near the canthus of the eye. In cases of suppressed hæmorrhoids or menses, the application of leeches to the anus, the anterior part of the insides of the thighs, particularly after blood-letting from the feet, certainly is frequently productive of advantage, even although it very often fails of restoring the suppressed evacuation.

141. Some physicians rely almost entirely on blood-letting, whilst others too frequently discard it. Others more rationally view it as a most important, and a frequently, but not an universally required remedy. It is by not attending to the pathological states, which I have endeavoured to point out (§ 108—122.), and to the changes of vascular action which take place during the attack, that such difference of opinion exists, and the indiscriminating practitioner is led to the injurious adoption of one mode of practice only. Among those who prescribe blood-letting almost unreservedly, and to a great extent, I may adduce the respected authorities of CULLEN, CHRYSE, PITCHAM, COOKE, and ABERCROMBIE; whilst the injurious effects of the practice in many cases, and its applicability to certain states of the disease only, have been ably argued for by KIRKLAND, FOTHERGILL, HEBBERDEN, BARRETT, and DUFFIN. There can, however, be no doubt of the propriety of having recourse to vascular depletion in the states of apoplexy now under consideration,—the general character of the symptoms, circumstances of the case, and the effects produced by the first bleedings, being our chief guides as to the extent to which it should be practised. But in the forms of apoplexy characterised by marked deficiency of vital power and action, or sometimes at the commencement of the seizure, when the symptoms, owing to the severe shock sustained by the brain, very closely resemble those of concussion, and before the powers of life recover themselves, and react (§ 111.), blood-letting would generally be attended either with fatal sinking, or with effusion, giving rise to hemiplegia where effusion had, as yet, not taken place, and with a fatal increase of it, in some where it had already existed.

142. Next to blood-letting, *active purgatives* are most deserving of notice, as being very generally applicable and beneficial. In many of the most severe and sudden attacks it is often difficult, and sometimes impossible, to administer purgatives in the usual form by the mouth. But we may always succeed by mixing from 10 to 15 grains of calomel in sweet butter, and placing it upon the root of the tongue. In some cases, two or three grains of powdered cambrage may be added to it.

143. Whilst we are waiting the operation of the purgative, it will frequently be advisable, particularly when there is much heat of head, and action of the carotids, to plunge the feet and legs in warm water, and apply cold to the head, either in the form of *affusion* of cold water, or of epithem. Great care is necessary not to continue affusion too long, nor to depress the temperature too low, as the risk of inducing hemiplegia will be increased by the practice, particularly

when vascular action is not considerable. After the affusion has depressed the temperature to about the natural standard, cold lotions or epithems, or even frequent cold-sponging, will be sufficient; but increased heat generally returns, and then the affusion should be again resorted to. In general, as soon as the temperature of the head becomes natural, and continues so for some time, and the fulness of the features entirely subsides, cold applications may be omitted. As thus used, they have received the sanction of THILENIUS, CRELL, WEICKAND, CARRETTE, WERRER, and ABERCROMBIE; but QUARIN very judiciously cautions against the indiscriminate and too long continued use of them. CRUVEILLIER, and other French physicians, advise the application of ice for an hour or two, twice or thrice a day, to the head; but, excepting in the more inflammatory states of the disease, it is not required, and may even be attended with risk.

144. If the purgative already exhibited does not operate in about four hours, one or two drops of *croton oil* should be placed upon the tongue, mixed with a few drops of castor oil, or in a little sweet butter, as advised above; and, about an hour afterwards, the action on the bowels ought to be promoted by the following enema:—

No. 30. R. Olei Ricini, Ol. Terebinth., aa ʒj.—3jss.; Decoct. Avenæ, ʒxij. M. Fiat Enema.

This will generally succeed; but if it come away without feculent or copious evacuations, it should be repeated in from one to six hours, according to the extent of its effect. In obstinate cases, one part of *croton oil* added to about eight or ten of castor oil may be assiduously rubbed over the abdomen. This, however, will seldom be requisite, as a repetition of the enema will rarely fail, and will act more beneficially on the disease than the introduction of so irritating a substance as *croton oil* into the circulation. In some cases it may be advisable to render the enemata more irritating by the addition of compound extract of colocynth. Irritating injections are enjoined by ARETÆUS, FORESTUS, and many modern authors, particularly THILENIUS. In cases following hæmorrhoids, they are more especially indicated, after leeches have been applied to the vicinity of the anus.

145. After the bowels have been fully evacuated, we must still endeavour to excite the alvine secretions, particularly those of the liver. The region of the liver and epigastrium should be examined: and, if there be fulness there, cupping may be performed in this situation. The calomel may be repeated in smaller doses, oftener than once, and combined with some preparation of *antimony*, or James's powder. In all cases where the apoplectic seizure is attended with increased vascular action, antimony may be given; but sickness or retching should be guarded against. It will be frequently observed that a repetition of the calomel, particularly after full depletions, will be soon followed by a flabby state of the tongue, indicating its incipient action on the mouth, and the propriety of omitting it, and of continuing the purgatives. It is frequently not till now, particularly where the apoplectic seizure has been preceded by much torpor of the liver, and accumulations of viscid bile in the gall-bladder and hepatic ducts, that the purgatives succeed in bringing away dark, greenish black, of

sensitive motions, the discharge of which is generally followed, in robust subjects, by rapid amendment.

146. When the disease is attended with *hemiplegia*, or when the paralysis appears in the course of the attack, we may generally presume that extravasation has taken place. In these cases very large or repeated depletions will not much accelerate the removal of the effusion; this is a work of time. The object rather is to arrest the hæmorrhage by the operation; but even this will not be so readily accomplished, owing to the physical condition of the organ. Indeed, if the depletion be carried beyond a certain extent, in relation to the peculiarities of the case, the risk of renewing the hæmorrhage will even be increased; for, as we cannot, as already stated, materially diminish the quantity of blood in the brain, we only accelerate its circulation by large depletions, and thereby risk an increase of the mischief. On this account, therefore, the intentions with which blood-letting is to be employed, are, 1st, to arrest the hæmorrhage, and 2d, to diminish or keep down the action of the heart and arteries; but, although essentially requisite in the majority of cases, full blood-letting will be of itself insufficient to accomplish these purposes; and we have therefore to bring to its aid the application of cold to the head, active purgatives, derivatives, and a judicious combination of antimonials and cooling saline medicines, which ought always to be exhibited, at short intervals, and continued for some time during convalescence; two or three grains of blue pill being also taken at bed-time, and an aperient draught the following morning. Any of the following saline medicines may be employed when we wish to lower the action of the heart or arteries of the brain:—

No. 21. R. Vini Antimonii Tart. ℥ xvj. — 3 ss.; Liq. Ammon. Acet. 3 ijs.; Potassæ Nitratis gr. v.—x.; Aquæ Puræ 7 x.; Syrup. Croci 3 ss. M. Fiat Haustus, tertiâ vel quartâ quaque horâ sumendus.

No. 22. R. Potassæ Sub-carbon. 3 j.; Succ. Limon. recent. 3 ijs. vel q. s.; Aq. Fœniculi 3 iij.; Vini Antimonii Tart. 3 iij.—3 iij.; Syrup. Tolutan. 3 j. M. Fiat Mist. ejus sumantur cochlearia duo larga secundâ vel tertiâ quaque horâ.

No. 23. R. Potassæ Nitratis gr. x.; Aq. Cinnamomi 3 j.; Liq. Ammon. Acet. 3 ijs.; Spirit. Æther. Nit. 3 ss.; Syrup. Limonis 3 ss. M. Fiat Haustus, tertiis horis capiendus.

147. When the measures stated above leave considerable exhaustion, and particularly if accompanied with sopor, weak action of the carotids, a cool state of the head, and unperspirable surface, it will generally be necessary to venture upon the use of very gently restorative and diaphoretic medicines. These ought, however, to be cautiously commenced with; and, when we have reason to infer that the attack has proceeded from extravasation, which is most frequently the case, we should carefully watch their effect, or delay them until after the twelfth or fourteenth day from the seizure. Inflammatory action in the surrounding portion of brain, consequent upon the extravasation, usually supervenes from the fifth to the fourteenth day. During this time, therefore, perfect quietude of body, stillness, and silence, and disengagement of the senses and mental faculties, should be enjoined, and febrifuge medicines prescribed, in order to suppress local action, and the consequent fever which often manifests itself at this period. The patient should be either kept in bed, or on a couch, with his head and shoulders well elevated; and visitors

ought not to be admitted to him. The eighth day is generally the most dangerous, as respects either a renewal of the hæmorrhage, in the immediate vicinity or surface of the parietes of the hæmorrhagic cavity, or in a different part of the brain, or the occurrence of serous effusion between the membranes or in the ventricles. During the first days, therefore, of the attack, we should only venture on the more gentle febrifuge diaphoretics; and after the second or third week, somewhat more restorative means may be employed, if the state of the vital energies requires them. The following may be resorted to in the order in which they are placed:—

No. 24. R. Potassæ Nitratis gr. v.—vij.; Mist. Camphoræ, Aq. Fœniculi, 5â 3 ijs.; Liq. Ammon. Acet. 3 iij.—3 iij.; Spirit. Æther. Nit. 3 ss.; Syrup. Limonis 3 ss. M. Fiat Haustus, quartâ quaque horâ sumendus.

No. 25. R. Vini Antimonii ℥ xij.—xx.; Mist. Camphoræ 3 iij.; Aq. Cinnamomi 3 ss.; Liq. Ammon. Acet. 3 iij.; Syrup. Aurantii 3 j. M. Fiat Haustus, quartâ vel quintâ quaque horâ capiendus.

No. 26. R. Mist. Camphoræ 3 j.; Liq. Ammon. Acet. 3 ijs.; Spirit. Ammon. Arom. ℥ xx.—3 ss.; Syrup. Tolutan. 3 j. M. Fiat Haustus.

No. 27. R. Infus. Calumbæ (vel. Infus. Valerianæ), Mist. Camphoræ, 5â 3 v.; Sodæ Sub-carbon. gr. x.; Spirit. Æther. Sulphur. Comp. 3 j. M. Fiat Haustus, bis terve in die sumendus.

Before I proceed further, in noticing the other remedies which may be resorted to, or have been recommended, I will state the means which are most appropriate to the weaker states of the disease, and when the systolæ is greatly depressed by the shock of the local lesion, or before increased action has taken place.

148. *b. Treatment of the depressed states of apoplectic seizures.*—It will be apparent from the particular details I have given of the symptoms, causes, and pathological states of the disease—1st, That much depression or exhaustion of the vital powers of the brain exists in some cases throughout the attack, even rapidly terminating in death without any effort at vascular reaction, particularly when this state is mistaken, and treated by depressing remedies; and, 2d, That this depression is often analogous to concussion of the brain, owing to the extent of the local lesion; and, like this result of external injury, is frequently followed by reaction of the heart and arteries (§111—118.), when the lesion constituting the seizure is not so great as to overwhelm the powers of life.

149. It is owing, in my opinion, to the employment of too large blood-lettings in such cases, to the having recourse to them at all in others, or to practising them without sufficient regard to this period of the seizure, and before the occurrence of reaction,—the time when they are imperatively called for,—has supervened, that the practice has disappointed many who have adopted it, and led others to employ an opposite mode of treatment in an equally exclusive, and hence dangerous, manner. The judicious use of *gentle stimuli* during this state of depression will have the effect in some cases of bringing about a moderate reaction, when death would be the result of other means; and, by diminishing and shortening the stage of depression in others, and thereby lessening the congestion of the capillaries of the brain, that inordinate degree of arterial action consequent upon the obstruction, and indirectly produced by it, will be prevented. In some more doubtful cases, as when the pallor of the countenance is connected with a natural, or

not very depressed state of the pulse, and temperature of the head, and when there are vomiting and other symptoms, indicating that hæmorrhage and laceration of a portion of the cerebral structure have occurred, blood-letting may be advantageously conjoined with cordial remedies, calculated to restore the tonic contractility of the vessels of the brain.

150. It will appear from what has been stated, that those who deny the efficacy of blood-letting are in some respects justified by the frequent deficient vital energy of the brain, and by the injurious effects of the remedy in some cases, whilst they err in a too general recommendation of opposite means. Both parties, however, place great dependence upon active purgatives, and I believe that much of the success obtained by the abettors of both modes of practice is to be ascribed to them.

151. In apoplectic cases, therefore, with signs of deficient vital energy of the brain and constitution,—and, when we refer to our experience, or consider the nature of many of the exciting causes, as well as the very far advanced ages of the great majority of apoplectic patients, the number of such cases will appear by no means small,—and at the commencement of some seizures, before reaction has supervened, when the countenance is pallid or sunk, the pulse of the carotids weak or small, the temperature of the head not increased, and profound sopor, rather than very stertorous or strong breathing, is present, gentle restoratives, administered either internally or externally, are the most serviceable.* The propriety, then, of attending to the fact, that apoplexy often is originally dependent upon the state of the sensorium—upon the depressed vital energy of the encephalon, as well as upon extravasation, or primary or consecutive vascular turgescence, and increased action—is manifest. And hence will appear the reason that restorative measures are required in some cases and not in others, or at one stage of an attack and not at another; physicians being led, by the success obtained from one method of cure on some occasions, to employ

it too generally, and hence in many instances in which it is inappropriate.

152. The restorative means that may be resorted to, scarcely admit of particular notice. The practitioner must be guided in his choice of them by the circumstances of the case. Where there is sopor, or coma, or lethargy, without much stertor of breathing, and when hemiplegia or paralysis is not present, *camphor* in moderate doses, either alone, or combined with *ammonia* or the *spir. æth. sulph. comp.*, the *spir. lavand. comp.*, and various others, may be adopted. It is only in such cases, and when the action of the carotids is weak, the head cool, and the countenance sunk, that the *infusions of arnica* or of *serpentaria*, which have been recommended by QUARIN, AASKOW, WERNER and THOMANN, are admissible. In more doubtful cases, the preparations of *ammonia*, the *spiritus ætheris nitrici*, the *infusion of valerian*, may be cautiously exhibited. In some, particularly at the commencement of the seizure, *volatile substances*, such as the preparations of ammonia, and aromatic vinegar, held to the nostrils occasionally, will be of much service. Where the attack is either preceded or accompanied by hemiplegia or paralysis, (§ 31—43.), stimulants, whether exhibited internally, or held to the nostrils, may be more hurtful than beneficial. In these, even the use of cold applications to the head, excepting there be marked increase of temperature, is seldom productive of much advantage. *Purgatives* are, however, required, but the choice and repetition of them should entirely depend upon the state of the secretions, the torpor of the bowels, and the character of the stools.

153. *c. Remedies which have been recommended, and are admissible in certain states of either the sthenic or asthenic forms of attack.*—*Emetics* are amongst the remedies, the admissibility of which has been most questioned. The young practitioner will, if he have recourse to written authority, be quite bewildered by the diversity of opinions respecting them in this disease. He will find SYDENHAM, PITCAIRN, KIRKLAND, SELLE, FOTHERGILL, COLOMBIER, CONRADI and FABER, in favour of them; and HAGENDORN, BORSERI, QUARIN, WALTHEY, CULLEN, TUESSINK, RICHTER, PORTAL, and CHEYNE, opposed to them. But, when the attack has been brought on by an overloaded state of stomach, by intoxication, narcotic poisons, or other hurtful ingesta, and more especially when hemiplegia is not present, or if the attack be of the active kind, and full depletion has been performed, emetics may be both safely and advantageously administered. This opinion seems agreeable to the recommendations of HIPPOCRATES, MORGAGNI, STOLL, BLANZ, and the late Professor GREGORY.

154. The propriety of having recourse to *blisters* has likewise been questioned. The great majority, however, of authorities are favourable to the practice in some state or other of the disease, the situation, the period, and form of attack, being the chief points of dispute. BARTHOLINUS, CANDLER, CULLEN, and many others, recommend them to be applied to the head. Whilst TODE, BAGGIVI, STOLL, PORTAL, and PICQUE consider them injurious in this situation. In the active states of the disease, in those forms which are complicated with hemiplegia, or are preceded by it, blisters on the head seem hazardous reme-

* Travelling in the summer, in one of the short stages, I sat opposite an aged and corpulent man, who, very soon after our leaving town, suddenly lost his consciousness and power of motion. His countenance became first pale, then bloated and inexpressive, his breathing slow and slightly stertorous, all his muscles completely relaxed, and he fell, in a few seconds, upon those sitting around him. We were only a few doors from a chemist's shop; the coach was stopped, and he was carried thither. He was now profoundly apoplectic; a copious perspiration flowed from his face and forehead, the veins of which were distended, and all his senses were completely abolished. There was no sign of hemiplegia,—but there was general and complete loss of motion and sensation. His neckcloth having been removed, the pulsation of the carotids was found to be slow, and of natural strength and fulness. Whilst he was held in a sitting posture in a chair, cold water was poured gently over his head from a sponge, and his head frequently sponged with it; volatile salts also were held for a short time, and at intervals, to his nostrils. The power of deglutition was at this time abolished, so that it was impossible to administer a draught, chiefly consisting of a small quantity of spiritus ammoniac aromaticus and camphor mixture, which was prescribed. In a very few minutes his consciousness returned, he took the draught, and, in a short time afterwards, he walked to a coach, in which I accompanied him home. He now complained only of very slight confusion of ideas, with scarcely any headache, but his carotids beat more firmly. One full blood-letting, and an active purgative, were now directed. The next day he was perfectly well, and has continued so. What would have been the result if he had been largely bled previously to the reaction?

dies, and are, moreover, in the way of more appropriate means; but in the weakest forms of the disease, when, from the depressed state of vital energy of the brain and lowered action of the carotids, the sensorium requires to be excited, they may be of service. Where, however, there is any doubt respecting the propriety of applying them in this situation, it will be better to omit them, or to direct them to another part. When stupor or coma exists, and the symptoms are not of the strong character, they may be applied to the nape of the neck, between the shoulders, or insides of the thighs or legs, after general or local blood-letting has been practised.

155. *Sinapisms*, or *stimulating frictions*, and *liniments*, applied to the lower extremities, are very generally applicable, particularly after resorting to pediluvia, care being afterwards taken to preserve a continuance of the increased flux of blood to these parts, when this is procured, either by warm applications, or by a frequent renewal of the above means. *Sternutatories* have been considered injurious by BAILLOU, MORGAGNI, BUCHNER, and others, and I conceive with great justice. A nearly similar opinion may be given respecting *electricity* and *galvanism*, which have been recommended to be tried by some authors.

156. The exhibition of *mercury*, chiefly in the form of calomel or blue pill, in large doses, so as to act upon the biliary secretion and bowels, and subsequently to excite *salivation*, has been recommended by DOLÉUS, SCHÜRIG, GHISI, and HORV. My experience of the practice has led me to think favourably of it in most of the apoplectic states, when the powers of the constitution are not far reduced; and the patient is not very old. *Antimonial preparations* have already been prescribed, and are of much service in the more active or strong forms of the disease, whether accompanied with hemiplegia, or without it. They are not so admissible, however, in the very depressed states of vascular action, and in the forms of attack which commence slowly, or are preceded by, or attended with, paralysis, indicating softening and infiltration of the cerebral substance. *James's powder*, and the *tartarized antimony*, are the best preparations: the former of which may be advantageously combined with calomel; the latter with saline medicines. (See B. 21, 22, and F. 854.)

157. *Setons*, *issues*, and *moxas* have also been advised, particularly when stupor continues after the more urgent symptoms have been mitigated. I concur with LANCISI and LA MORTE in considering them very deserving of adoption in such cases. *Moxas* applied on the occiput produce a more rapid effect, and are therefore preferable during the period of attack; *setons* are more suitable in the prophylactic and consecutive treatment. The *actual cautery* and *moxas* have been strongly recommended by ALBUCASIS, who directed them in the course of the coronal suture; by MARCELLUS DONATUS, who prescribed them to the occiput; by SCHLHAMMER, to the vertex; by SCHREIBER, to both the vertex and soles of feet; by MISTICHELLI, to the feet; and by THILENIUS and SEVERINUS. These means are very generally applicable, and may be resorted to in the worst cases of apoplexy, particularly those complicated with hemiplegia, and when brought instead of appropriate means.

158. In cases characterised by a full, tumid, flushed, and livid countenance, full or strong pulse in the carotids, heat of head, with or without hemiplegia, I prefer, after copious general depletion, *scarifications* of the scalp, more or less deep and extensive, to be made over the occiput, so as to allow of a free sanguineous discharge. The practice has been recommended by HIPPOCRATES and MORGAGNI. Cupping glasses may be also applied over the scarifications, when we desire to procure a more copious discharge. In the low or weak states of the disease, dry-cupping on the nape of the neck may be tried, as advised by ARETÆUS.

159. After the attack has been so far mitigated that the patient has recovered the faculty of deglutition, I have often seen decided advantage derived from a draught consisting of equal quantities of the *oleum terebinthinæ* and *oleum ricini*, particularly when the bowels required to be fully acted upon. If the attack possess the sthenic character, and signs of fullness of blood about the head still continue, about half an ounce of each may be exhibited on the surface of mint water; and, if necessary, repeated a second or third time, from twelve to twenty-four hours intervening between each dose. This will promote a more complete revulsion from the head than any other means that can be employed, particularly when preceded by calomel, or other cathartics, or followed by the emetia prescribed above. (§ 144.). In the weaker states of attack, when we wish the medicine to act partially, it being absorbed into the circulation; and in cases where, from the mode of seizure and progression of the disease, we suspect hæmorrhage or infiltration of blood in the brain, the following draught may be exhibited: I have found it serviceable in such cases, even in some attended with the most unfavourable symptoms; as very frequent, small, and intermitting pulse, and unconscious discharges, &c.:—

No. 28. R. Olei Ricini, Ol. Terebinth., ʒʒ 3 ss.—ʒij.; Tinct. Capsici Annui ℥ x.—xvj.; Olei Cajuputi ℥ iv.—vj.; Aq. Menth. Virid. ʒjss. Fiat Haustus, omne bichorion sumendus ad secundum, tertium, vel quartum vicem.

In some instances, where the lethargy has been profound, and the constitutional powers far depressed, I have derived much advantage from *camphor*, *ammonia*, and *ether*, given in suitable doses in the intervals, and continued after the above medicine had been carried as far as was considered either necessary or prudent.

160. It is generally requisite to have the hair of the patient cut very close, or shaved off, as soon after the seizure as possible; and to attend to the injunction of MORGAGNI, never to omit enquiring after the state of the urinary discharge, and examining the hypogastrium, lest accumulations of urine take place, which should be immediately removed by the catheter, to prevent their injurious effects on the disease, and on the bladder.

• 161. *d. Of the treatment of the consecutive and complicated states of apoplectic seizures.*—A great majority of such cases requires but very slight modifications of the measures already stated. The importance of directing our means so as to restore *suppressed discharges*, &c. when the attack arises from this cause, has already been pointed out. When it proceeds from the extension of

inflammatory action to the brain, and its termination in abscess, effusion, &c., the principles stated above are still applicable. If the disease possess either a *gouty* or a *rheumatic character* (§ 92, 93.), bleeding from the feet, local depletions, sinapisms, or other rubefacient applications, &c. to the lower extremities, or to the joints or parts antecedently affected by gout or rheumatism, active purgatives, and the preparations of colchicum combined with soda, and moderate doses of camphor, are the most advisable remedies. In most cases of this description great accumulations of morbid sordes have formed on the digestive mucous surfaces, and thick or viscid dark bile in the gall-bladder and hepatic ducts; therefore, after cupping on the nape of the neck, active calomel purges, promoted by enemata, are to be given, previously to having recourse to *colchicum*, which ought to be combined with alkalies,—with *ammonia* or other restorative medicines, if the attack presents the asthenic character, and with aperients; active *revulsants* being simultaneously employed.

162. When the apoplectic state arises from *erysipelas* of the head and face, incisions made into the scalp of the occiput, so as to allow a free discharge; cupping on the nape of the neck; active purgatives, consisting first of calomel combined with the tartrate of antimony or with James's powder, and compound extract of colocynth, followed by the draught of turpentine and castor oil advised above (§ 159.); and saline medicines, with the vinum antimonii; are the means most to be depended upon. In cases of this description the most active purgatives are required, and must be frequently repeated. The croton oil may be here exhibited, as already advised (§ 144.), and enemata should be administered from time to time. These already prescribed (§ 144.), or F. 141. 151. are most to be depended upon in this state of disease. Revulsants, and rubefacient pediluvia, are also serviceable aids.

163. When the apoplectic attack occurs on the invasion, or in the advanced stages of *fevers* (§ 94.), the general principles of treatment already laid down cannot be departed from. When it comes on at the commencement of fever, general or local depletions are required, with cold affusion to the head, purgatives, saline medicines, and counter-irritation. But even here, the probable state of the circulation within the head should be enquired into previously to the adoption of the means of cure; for, if the head be cool, the action of the carotids natural or below the healthy standard, and the attack be unattended by paralysis, restorative measures are called for, although the subsequent occurrence of reaction will afterwards require active antiphlogistic measures. When the attack occurs in the last stages of continued or eruptive fevers, it most frequently presents the asthenic character, and is often an aggravated state, or a modification merely, of coma, unless hemiplegia accompany it. In these cases, local depletions from the occiput, the neck, and behind the ears; active purgatives; revulsants and counter-irritants, as blisters or sinapisms to the lower extremities, nape of the neck, or epigastrium; camphor, combined with ammonia, ether, and liquor ammoniac acetatis, particularly when the head is cool, and the puls-

ation or the carotids is neither full nor strong; and, in the most asthenic cases, camphor in larger doses, the infusions of arnica, or of serpentaria (F. 222. 262.), are chiefly to be depended upon. After local depletions and revulsants have been prescribed, and one or more doses of calomel and rhubarb premised, the draughts directed above (R 23. 26, 27, 28.), or F. 270. 463., followed by enemata (F. 138. 149.), may be exhibited.

164. The association of apoplectic seizures with disorders of the *digestive organs*, particularly those of the liver (§ 97, 98.), requires local depletions from the right hypochondrium and epigastrium, followed by blisters in this situation, and a strenuous use of purgatives and mercurial preparations, until the secretions assume a healthy appearance. When the attack proceeds from impeded circulation through the lungs and right side of the heart (§ 95, 96.), local depletions, counter-irritation, and diaphoretics, are chiefly to be depended upon. But in these cases care must be taken not to deplete too much, as the circulation may be still more impeded by the loss of power thereby produced. In some instances of this kind, it will even be necessary to support the vital energies by suitable means, and to deplete the vascular system at the same time. When the attack is occasioned by hypertrophy of the left ventricle, general and local depletions are better borne than in the foregoing cases, and may be carried to a considerable extent. In both descriptions of cases, revulsants and counter-irritants, particularly by issues, and the tartar emetic ointment, are beneficial.

165. When the attack is occasioned by *narcotics* or *spirits* taken in immoderate quantities, the stomach should be emptied by the stomach-pump, or by an emetic, a moderate blood-letting having been premised; and afterwards, the cold affusion to the head; internal stimuli, as camphor, ammonia, and ether; warm, strong coffee; and purgative enemata, should be prescribed. The occurrence of the seizure, also, during *child-labour*, or after *epileptic* or *hysteric* convulsions, requires large blood-lettings, preferably from the feet, the cold affusion to the head, cathartic injections, &c.*

166. Attacks consequent upon *colica-picturum* (§ 99.), two instances of which have occurred to me, generally require local depletion, full doses of calomel, followed by active purgatives and enemata (§ 142.). The draught of castor oil and turpentine (§ 144.), or the croton oil, followed by injections, are here chiefly to be confided in. If purgatives given by the mouth are thrown off the stomach,—a circumstance which not infrequently occurs in these cases,—a large dose of

* I was lately called to a case of puerperal convulsions which had terminated in the apoplectic state. When I saw the patient, the labour had not proceeded so far as to admit of delivery by means of instruments. The pulse was slow and full; the breathing slow, laborious, and stertorous; the lips puffing and frothy, the countenance tumid and livid; all the limbs flaccid, insensible, and incapable of motion. She had been blooded largely before I was called. The feet and legs were directed to be placed in a pan of hot water, and the asphene veins to be opened. Whilst the blood flowed, the cold affusion on the head was employed. These means were evidently beneficial, though insufficient. A cathartic enema (F. 149.) was thrown up immediately, and with great difficulty; consciousness slowly returned; when the decoction of the scallae cornutæ, with as much borax sodæ as it could dissolve, was administered. Uterine action afterwards came on, and the patient recovered.

calomel will generally be retained; and will allay the irritability of the stomach: other medicines may be afterwards exhibited, or a mixture of croton and castor oils rubbed over the abdomen, and cathartic injections thrown up. The other states and complications of the disease must be treated according to the views and principles already explained, and with due reference to the nature of the pre-existing disorder, when it appears to be a consecutive affection, or a principal part of a complicated state of disease.

167. C. TREATMENT SUBSEQUENTLY TO THE ATTACK, OR THE CONSECUTIVE TREATMENT.—The symptoms consecutive of apoplexy have a strict relation to the changes which take place in the seat of lesion. The absorption of the blood, and the process of cicatrization, require several months for their completion. During this time great care should be observed to prevent inflammatory action from taking place around the extravasated blood, and a return of the hæmorrhage. This object is best obtained by adopting very nearly the same measures as have been recommended to prevent the accession of the attack (§ 126. *et seq.*). A too sedentary or studious mode of life, watchfulness, much indulgence of sleep, frequent stooping, and all the remote causes of the disease, must be carefully shunned. The strictest temperance and moderation, in respect both of eating and drinking; moderate exercise in the open air; tranquillity of mind, sedulously avoiding the least approach to bodily or mental fatigue, and excitement of the feelings or passions; the preservation of a free state of the alvine secretions and excretions, by means of mild and deobstruent purgatives and cathartic enemata; general or topical blood-letting, particularly every spring and autumn, with low living or a vegetable diet, when there is a tendency to vascular plethora; caustic issues, or setons in the nape of the neck, or in the course of the cervical spine; the use of the tartar emetic ointment, so as to keep out for a considerable time a pustular eruption on the part to which it is applied; sleeping on a hair-mattress, with the head and shoulders slightly elevated, and early rising; are amongst the most efficacious means that can be adopted.

168. For persons who are prone to plethora, in addition to periodical depletions and low diet, the following pills and electuary may be taken on alternate nights:—

No. 29. R. Pilul. Hydrarg. Subdur. Comp. gr. iij.; Pulv. Jacobi Veri gr. ij.; Saponis Castil. gr. iv. M. Fiat Pilulæ iij. h. s. s.

No. 30. R. Potassæ Subtartar. ʒj.; Sodæ Subboratis gr. x. (vel Magnesie ʒj.); Confectionis Sennæ; Syrup. Zingiberis, aa ʒj. M. Fiat Electuarium, pro dose, horâ somni, alternis noctibus sumendum.

169. When the disease is connected with the gouty diathesis, vegetable diet, the sub-carbonates of the fixed alkalies, with the extract of taraxacum or the preparations of aloes, the occasional use of an active cathartic, and the other prophylactic measures recommended in the article on Gout, are requisite. In all cases, as much benefit will now accrue from a strict attention to regimen and diet, as from medicine. The food should be light and digestible, of very moderate quantity, chiefly farinaceous, and taken at regular hours. Suppers should be avoided, or be extremely light, and taken a considerable time before the usual hour of repose. Fish, and ripe

fruits, may be partaken of in moderation; and the waters of Cheltenham occasionally tried, or the following used as a substitute:—

No. 31. R. Magnes. Sulph. ʒss.; Potassæ Sulph. ʒij.; Infus. Rosar. Co. et Mist. Camphoræ aa ʒijss. M. Capiat Coch. iij. amplâ primo mane quotidie.

170. After attacks of the more asthenic states of apoplexy, a more tonic regimen than that directed above may be adopted; but it should be conjoined with the same attention to the digestive, secreting, and excreting functions. Attacks of this description most commonly proceed from depressing or exhausting causes, which ought either to be avoided or counteracted; and when they are not characterised by plethora, or disposition to increased action, gentle tonics, combined with aperients, a light strengthening diet, the occasional use of the preparations of *strychnine*, or *iodine*, as recommended in the article on PALSY, and the mineral waters of Bath, Leamington, or Buxton. The following may also be occasionally taken:—

No. 32. R. Potassæ Sulphatis ʒij.—3 iij.; Infus. Rosar. Co. ʒvjss.; Acidi Sulphur. Arom. ʒj.; Tinct. Aurantii Co. ʒss. M. Capiat Coch. iij. amplâ primo mane.

171. In all cases of the consecutive treatment, the progress of the paralytic or hemiplegic affection towards removal should receive attention. In the more favourable cases, as the period of attack recedes, first sensation, and afterwards motion, return in the part affected limbs; and generally the lower extremity experiences the amendment before the upper. As recovery proceeds, the patient should always wear a hair cut short, and sponge his head with spring water night and morning. In summer he may use the shower bath daily, if he be not far advanced in life, or much debilitated. As much of the treatment described in the article PALSY, as may suit the circumstances of the case may also be adopted, for the removal of this common sequela of the attack. (See also ASPHYXY, and POISONS.)

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1. APOPLEXY OF NEW-BORN INFANTS — Generally proceeds from a protracted or difficult parturition, particularly when the infant is large and plethoric, or when the chord has passed around the neck, occasioning both interrupted circulation in the chord, and obstructed return of blood from the brain. The apoplectic state in new-born infants is accompanied with tumefaction of the face, head, and neck, which, with the whole surface of the body, is generally of a bluish or violet colour. The muscles are flaccid, the limbs flexible, and the body warm. The pulsations of the heart and of the chord are generally obscure, or not to be felt; respiration is suppressed; and death soon takes place, in extreme cases, if judicious means of restoration be not resorted to.

2. Upon examination of fatal cases, the vessels of the encephalon are engorged with blood; and occasionally blood is extravasated in the substance of the brain, or between the membranes. The lungs are also generally congested. It is evident that the pressure of the turgescient vessels and extravasated blood upon the brain, and origin of the respiratory nerves prevents the respiratory actions from taking place, and that all attempts to excite respiration will be ineffectual until the pressure is removed. The umbilical chord should therefore be immediately divided, and allowed to bleed to the extent of two or three spoonful, according to the size and strength of the infant. When the apoplectic state is occasioned by congestion of the vessels merely, respiration will take place as soon as the vessels are unloaded, if no mechanical obstacles to the entrance of air into the lungs exist. Mucosities should be carefully removed from the throat, mouth, and nostrils; and, if the respiration does not spontaneously take place, insufflation of the

lungs, as recommended in the article on *ASPHYXY of New-born Infants* should be performed.

3. When the circulation is so torpid that the blood will not flow from the portion of umbilical chord attached to the infant, the little patient should be placed in a warm bath, rendered more stimulating by some salt, or by a little mustard; the portion of chord attached to the abdomen, or the abdomen itself, may be pressed momentarily, at several times, and in the direction of the division. If these means fail of procuring blood, one leech may be placed behind each ear. In some cases the apoplectic symptoms return after respiration has been established. This is generally owing to some interruption to the circulation through the lungs. In these cases of secondary attack, the application of one, or generally two leeches, placing the body or the lower part of it in a warm bath, and, if requisite, inflation of the lungs, and the other measures advised in the article on *ASPHYXY*, must be resorted to; and they will be successful if the case admit of recovery.

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APPETITE, MORBID.

CLASSIF. 5. *Class*, Local Diseases; 2. *Order*, Depraved Appetites (*Cullen*). 1. *Class*, Diseases of the Digestive Functions; 1. *Order*, Affecting the Alimentary Canal (*Good*). 11. *CLASS*, I. *ORDER* (*Author*).

1. DEFIN. — *Excessive craving for food, or desire for improper substances.*

2. In this genus may be included two species, viz. 1st, *Excessive or insatiable craving for food*; and, 2d, *A desire for improper substances, or what is not food*. These states of function occur in practice variously associated and, although apparently different in themselves, yet they are often individually connected with similar states of the constitutional energies, and dependent upon nearly the same state of lesion, whether functional or organic. It would seem that manifestations of function often differ most essentially, in different persons, or under different circumstances, owing to causes which are so slightly dissimilar as not to admit of distinction, or even, in some cases, to appear very nearly the same. In all, or the great majority of cases belonging to these forms of morbid function, the general pathological states of the system are nearly the same; the difference, even when it is most marked, being chiefly referrible to variations in grade, and to states of the stomach, in respect of its sensibility, its secretions, tonic contractions, and states of its villous membrane, which can only be matters of inference, but seldom of demonstration. As regards their nature, these affections are much more frequently *symptomatic* of lesion of function or structure in some other organ, than *idiopathic*, or constituting primary disease of the stomach itself.

3. SPEC. I. *INSATIABLE APPETITE*. — SYN.

• *Bulimia* (from *βού*, the augmentative particle, and *λῦδος*, hunger), *Fames Canina*, *Limosis avens*, *Good*. *Bulimus*, *Polyphagia*, *Lycorexia*, *Cynorexia*, *Auct. Lat.* *Faim Canine*, *Fr.* *Der Heiss hunger*, *Ger.* *Dyspepsia Bulimia*, *Young*. *Gluttony*, *Canine Appetit*.

4. DEFIN. *A craving for food beyond the natural wants of the system, sometimes most excessive in degree.*

5. I. VARIETIES. An inordinate appetite is sometimes observed in the course of fevers and other acute diseases, particularly in convalescence from them; and in the progress of a number of chronic diseases. It is not infrequent in cases of extreme exhaustion, from whatever cause; and it may depend upon an acquired habit. But in order to consider it with some degree of precision, I will offer some remarks, 1st, upon habitual indulgence in an excessive quantity of food, or gluttony; 2d, an insatiable appetite from exhaustion; 3d, on the excessive appetite, which, from the extreme voracity of the patient, has been called canine; and, 4th, on the voracity which is followed by vomiting. These constitute varieties of nearly the same disease.

6. A. *Habitually excessive appetite, the Bulimia Heliconum* of CULLEN.—In some cases, the excessive indulgence of food has been of so long duration, and so scrupulously attended with so good a state of the general health, as not to appear in the light of a disease; but the results ultimately are, the production of so great vascular plethora, and disorder of the secreting functions, that, as soon as the vital energies begin to languish, apoplectic, paralytic, or other maladies supervene. This variety of morbid function may be hereditary, but it is oftener acquired. It is not infrequently observed in persons, originally of a strong constitution, who have indulged in large and frequent meals from having little else to engage their minds, and thus the vital energy has become concentrated towards the stomach and the rest of the digestive organs, exalting all their functions. Persons of this description usually become large, bulky, or corpulent; and if they take much exercise, the great indulgence of their appetite may not materially shorten their lives: but when sedentary habits and indolence are conjoined with it, apoplexy and organic disease of the liver, stomach, bowels, &c. are the common results.

7. B. *Inordinate appetite from exhaustion*.—This is often a symptom of other diseases, and is chiefly dependent upon altered sensibility of the nerves of the stomach, proceeding from weakened vital power. In many cases, however, it appears as the chief ailment, as after great fatigue of body and mind; after excessive venereal indulgences; in cases of great emaciation, sometimes without any evident cause; and during convalescence from fevers and other acute diseases. It is very often observed as an attendant upon organic diseases of the stomach, pylorus, mesenteric glands, liver, uterus, &c. It has also been remarked in cases where due nourishment could not be conveyed into the system, owing to disease of the absorbent system; and it is frequent in the last stages of chronic maladies, when about to terminate fatally. In many of such cases the craving for food is attended with a distressing feeling of inanition, sinking, and faintness. Some of the cases of excessive appetite that occur in pregnancy, or from the presence of worms, may also be referred to the debility and altered sensibility of the nerves of the stomach. And those which accompany inanition from a defective supply of chyle to the blood, may be attributed partly to the same cause, and partly to the instinctive wants of the system.

8. C. *Voracious or canine appetite, the Bulimia Symplocis* of CULLEN.—This extreme form

of the disease is generally dependent upon some organic change of the stomach; but this is more a matter of inference than of observation. The chief seat of disease may even be some other organ. The quantities of food, particularly animal food, cooked or raw, taken by some persons afflicted by this disease, are truly surprising.* One of the most remarkable cases in record is that published by M. PERCY (*Dict. des Sciences Méd.*, art. CAS. RARES). Both CULLEN and GOOD are incorrect in stating that this form of Bulimia is attended with faintness. This is only an occasional symptom, which was absent in both the cases that occurred to me, as well as in that recorded by Dr. CRANE. (*Lond. Med. Repos.*, vol. xvii. p. 293.)

9. D. *Voracious appetite followed by vomiting, the Bulimia Emetica* of CULLEN.—This variety of bulimia frequently proceeds from inflammatory irritation about the pylorus, but more commonly of the mucous surface of the stomach itself. The quantity of food devoured in this description of cases is often as large as in the last variety; but, shortly after having been taken, it is either altogether, or in part, thrown up, very little altered, and thus the patient continues alternately to crave for and to reject his food. This form of the disease has generally been imputed to a scirrhous state of the pylorus; but the case of Dr. CRANE, already alluded to, was evidently independent of such a cause.

10. II. CAUSES.—a. The remote causes of bulimia are chiefly hereditary predisposition; the habit of eating largely, voraciously, and without due mastication; chronic debility arising from obstruction of the mesenteric glands, liver, &c.; the suppression or disappearance of chronic eruptions, the healing of old ulcers, or the suddenly arresting habitual discharges, and the pathological conditions noticed in the foregoing remarks.

11. b. The immediate cause, or state of the organ on which it depends, seems to be somewhat different in the different varieties, even whilst the state of the constitutional or vital power may be considered to be, in the great majority of cases, very nearly the same. I believe that in many instances the voracious appetite is owing to an irregular distribution of the vital energy, and its concentration in the stomach, the nerves of this

* I have met with two very remarkable instances of this affection in children,—the one of seven years of age, the other of nine. In both these, but in the younger especially, the quantity of food devoured was astonishing. Every thing that could be laid hold of, even in its raw state, was seized upon most greedily. Besides other articles, an uncooked rabbit, half a pound of candles, and some butter, were taken at one time. The mother stated, that this little girl, who was apparently in good health otherwise, took more food, if she could possibly obtain it, than the rest of her family, consisting of six besides herself. In both this and the other case, the digestion seemed to be good. Three or four large feculent motions were passed daily, and a nauseous smell emanated from their bodies. These children, who were both very intelligent, complained of no other uneasiness than a constant gnawing or craving at the pit of the stomach, which was never altogether allayed, but which, shortly after a meal, impelled them irresistibly to devour every thing that came in their way, in the shape of food, however disgusting. Nearly twenty years ago I saw, for a short time, a case of this description, which occurred in a child of about the same age, and occasioned alarm, owing to the circumstance of a large quantity of raw fish having been devoured by it. The result in this case did not come to my knowledge, but the former cases, which occurred at the Infirmary for Children, recovered by means of the treatment which will presently be noticed.

viscus being morbidly sensible, the muscular coats more irritable, particularly in the fourth variety of the disease; and the mucous coat in a state of erythema, or vascular excitement, and yielding a much larger quantity of its proper fluids than in health. The excited state of the nerves of the organ will necessarily be followed by increase of its secretions, greater vascularity of its inner coat, and a disposition of the muscular tunics to react upon the enormous quantity of food which distends them; and thus there will result the craving of extreme hunger, a rapid solution of the food, and a quick transfer of it into the duodenum; or, if the reaction takes place suddenly, either vomiting or simple regurgitation of it, as in cases of *rumination*, which is sometimes complicated with bulimia. The more remote effects of this state of the organ are, torpor, debility, and a sense of faintness arising from the concentration of the vital energy, and determination of the circulation and secreting function towards the stomach and associated viscera, and the proportionate abstraction of vital influence from the brain and heart; imperfect assimilation; irritation of the digestive mucous surface, from unwholesome and unchanged food; an impure state of the blood, disorder of the secreting organs and morbid secretions,—all tending to disorganisation, and to the destruction of life.

12. *c.* The morbid appearances found on dissection consist chiefly of inordinate distension of the stomach and duodenum; a vascular and corrugated state of their mucous surface, constituting complete hypertrophy of these viscera; a flabby, softened, and sometimes thickened appearance of all these tunics (HAGSTROM); displacement of the right extremity or the greater part of the stomach low in the abdomen (FRENCH); induration and thickening of its coats (GOURNET); the insertion of the common bile-duct into its pyloric extremity (VERSALLIUS and BONET); dilatation of the œsophagus (SCHWIG); tænia in the bowels; lumbrici in the stomach and duodenum; enlargement and other organic lesions of the liver; scirrhus, thickening, and even dilatation (RUYSEN), of the pylorus; thickening of all the coats of the duodenum, forming hypertrophy of this part; and various organic changes in the mesentery, its glands, the pancreas, spleen, and very generally in the mucous surface of the small and large intestines. M. BECLAND observed, in a case of bulimia, the valvula conniventes as large as in carnivorous animals. And M. LANDRE-BEAUVAIS found, in a case complicated with pulmonary consumption, an unusually large size of the small intestines, and the gall-bladder wanting.

13. *d.* *Symptomatic bulimia.*—Inordinate appetite has sometimes been observed in cases of chronic disease of the brain, particularly in slow inflammation of its substance, threatening, or terminating in, insanity. A very marked case of this description, and two or three slighter instances, have come before me in the course of practice. I have also met with it at the commencement of hydrocephalus, and in epilepsy. When thus dependent upon disease of the brain, the inordinate indulgence of the appetite is often followed by vomiting. In the case of epilepsy, however, in which I met with it, vomiting never took place, although the quantity of food sometimes taken was most excessive. The first, or

slighter variety of the malady, is not uncommon in epilepsy, particularly in the hereditary epilepsy of adults; the second variety sometimes occurs in hysteria, chlorosis, and pulmonary consumption; and the fourth, occasionally, in chronic encephalitis.

14. Bulimia is more frequently met with, particularly in its slighter forms, in pregnancy and in verminous affections, and is then very generally attended with an urgent feeling of inanition and faintness. When it occurs in pregnancy, there is usually a fanciful longing for particular articles of food, of which an enormous quantity is devoured. A remarkable excitement of the nerves of the stomach may be inferred to exist in these cases, greatly augmenting the secretion of gastric juice. When the affection proceeds from worms, it may be imputed to the irritation of the nerves and mucous surface of the stomach and duodenum, whereby the circulation of, and secretions poured into, these viscera, are much increased, whilst the vital actions of the rest of the frame languish more or less.

15. III. TREATMENT.—The means of cure should have strict reference to the immediate cause to which we attribute the disorder. *A.* In the first variety of the disorder, it is generally in vain to state any means of cure. They entirely rest with the patient, by whom medical advice will seldom be followed. I have great doubt of a single glutton having been deterred from the habit he has acquired, by the injunctions of his medical adviser, until an attack of illness occasioned him alarm. The cure is sufficiently simple, and may be comprised in the single recommendation of employing his mind and body more, that he may abuse his stomach less.

16. *B.* In the second variety, great attention is required to adapt the treatment to the circumstances in which it presents itself. The nature of the malady of which it is most commonly a symptom, must necessarily be our guide; and as the means should be strictly appropriated to the peculiarities of the case, no general rules can be stated with propriety, further than that the effects of whatever is employed should be carefully watched, and that more mischief will result from indulging the craving complained of, than from opposing it, and allowing no more nourishment than the nature of the case, or the system, may seem to require. In the bulimia that occurs in convalescence from acute diseases, the wants of the economy are generally greater than in other cases, and here more may be allowed: if fever or disorder follow the indulgence, a purgative will generally remove it.

17. *C.* The preceding observations apply likewise to the third and fourth varieties of this disease. The cases which occurred in my practice were cured by an active course of nauseating purgatives, consisting chiefly of the oil of turpentine with castor oil. In one of the cases, where the voracity was almost incredible, the first dose of the turpentine was followed by the sudden appearance, over the whole trunk of the body, of a most copious and thick eruption, more nearly resembling porrigo favosa than any other, and by the equally sudden relief of the symptoms. This treatment was left off; when, after a few days, the eruption disappeared, and the voracious appetite returned. It was ultimately removed permanently by the hydrarg. cum creta, combined

with soda, taken at bed-time, and a turpentine draught in the morning of each third or fourth day. Leeches were applied over the epigastric region; and either the tartar emetic ointment, or liniment, was rubbed upon the same situation till a copious eruption of pimples was produced. The strictest regulation of the diet was enjoined.

18. *D.* In the variety attended with *partial or general regurgitation*, or vomiting of the food taken in excessive quantity, the best effects will result from obliging the patient to abstain almost altogether from food, or to take a small portion of nourishment in the least possible bulk. Great distress from hunger will be felt for a few days, but this will gradually subside. In the instructive case published by Dr. CRANE, this plan was persisted in; and portable soup, made into pills, was given, as the only nourishment, for several weeks: the patient recovered perfectly. A nearly similar treatment had been previously employed by Mr. WASTELL with success. (*Mem. of Med. Soc. of Lond.*, vol. iii. No. 2.) Where, however, the stomach is not so irritable as to throw off any portion of the ingesta, and has become distended and enlarged from habitual inregurgitation, a gradual diminution of the food will be better borne, and perhaps be more efficacious, than its sudden reduction. The propriety of employing decoctions, small doses of the blue pill, combined with ipecacuanha, active cathartics, either by the mouth or in the form of enema, and external irritants and revulsants, in cases of this description, cannot be questioned. Exercise, where it can be taken; and employment for both body and mind, as far as circumstances will permit; are also most useful adjuncts.

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SPEC. II. VITIATED OR DEPRAVED APPETITE.

—*SYN.* *Pica*, *Citta*, *Malacia*, *Pseudorexia*, *Limoris Pica*, *Good*, *Dyspepsia Pica*, *Young*, *Der Sonderbare Appetit*, *Ger.*

1. *DEFIN.* An appetite for substances which are not food.

2. *CAUSES.*—This state of the appetite sometimes occurs in children, from an early acquired habit; and it is frequently observed in idiots, from want of ability to discriminate what is or is not food, or from perversion of taste. Various substances also, which are abhorred in one climate, constitute the chief articles of diet in another. Thus, the Californians live on snakes, rats, lizards, &c., and numerous tribes of Africans on monkeys, dogs, snakes, &c. It is very frequently observed in pregnant, hysterical, and chlorotic females, and it is sometimes connected with certain kinds of mental emotion. I have met with several instances of it in females at the age of commencing puberty, when neither hysteria, in any of its forms, nor chlorosis, existed. In these, and perhaps in the great majority of cases, it is altogether a symptomatic affection,

arising from altered sensibility of the nerves, and modified state of the secretions of the stomach, occasioned by imperfect function, or changed condition, of a related organ, particularly of the uterus, ovaries, large bowels, and brain.

3. When it is observed as the primary disorder, it has generally been owing to a habit, commenced at first with the view of improving the shape and complexion. Females early in life sometimes have recourse to acids, particularly vinegar, and chalk, for this purpose. The form of the disease, which has been described by Dr. JOHN HUNTER as dirt-eating, by the negroes in the West Indies, and which has even assumed an epidemic character, is, perhaps, more than other forms of it, deserving of being considered as idiopathic. The earth they devour chiefly consists of a loam or clay, and may possibly be taken by them from the circumstance of their having found it assuage the painful sensations produced in the stomach by acidity. This affection is much more frequently met with in the female than in the male sex; but instances of its occurrence in the latter are not rare. I have seen several instances of it in males; and in females it is often practised in so concealed a way, as not to come to the knowledge of the medical attendant.

4. The substances which occasionally become the objects of desire are sufficiently numerous. Medical records abound with them. Cinders, spiders, lice, flies, insects, loads, serpents, wood, hair, paper, earth, clay, chalk, vinegar and other acids, and even ordure, have all been swallowed in cases of this disease. Various other substances have been swallowed, more as singular exploits than from actual longing for them. Thus we have accounts of persons taking into their stomachs clasp-knives, musket bullets, billiard balls, gold watches, and Louis-d'ors; and, what is still more singular, generally discharging them by stool a few days afterwards. Knife-eating seems to have been no uncommon feat, as we have instances recorded of London, Prussian, Bohemian, North American, and Brazilian knife-eaters. Our friends of the United States seem to have surpassed all others in the rapacity which their knife-eater exhibited; for in June, 1822 (*New York Med. Repos.*, Oct. 1822), after having been duly initiated in the art, by swallowing a gold watch, chain and seals, billiard balls, and various other articles, at different times, which had passed through his oesal digestive tube, he swallowed fourteen knives in the course of the day. This was his great, but his last exploit, for he died two months afterwards; having passed two of the knives by stool, the remaining dozen being found in the body,—eleven in the stomach, and one in the oesophagus.

5. The articles most commonly fancied by young females are paper, cotton, thread, chalk, vinegar and other acids. I once saw a sickly-complexioned lad, who was in the habit of eating sand; and a robust seaman, who occasionally would devour a whole wine or ale glass, having previously crushed it in small pieces with his teeth, and yet no bad effects resulted, at least for many months afterwards. (*Lond. Med. Repos.* vol. xviii.) The only other instance on record, where this most dangerous feat has been performed, is given by CAMERARIUS (*Memorab.* cent. v.).

6. When *pica* is complicated with *bulimia*, as

is sometimes observed, most singular and even astonishing feats in the way of devouring substances of the most unsuitable kind are on record,—many of them also so large, that the possibility of their being conveyed into the stomach, if they had not actually been found there, might have been doubted. Some really astonishing and authentic instances of this kind have been related by M. FOURNIER (art. CAS. RARES, *Dict. des Sciences Méd.* t. iv. p. 135.).

7. TREATMENT.—The means of cure must, of course, have strict reference to the morbid condition of the system, of which it is so frequently a symptom. If it accompany pregnancy, I believe that the axiom which M. FRANCIER adopts as the title of a treatise on the subject should be adopted, viz. A pregnant woman affected with pica should be well purged. If it be attendant upon chlorosis, aloetic purgatives, with emmenagogues, and these followed by or given alternately with tonics, are the most suitable means, and are equally beneficial in the pica which occurs about the period of puberty. In hysteria, similar measures, combined with valerian, asafoetida, camphor, and other antispasmodics, are indicated. In these three symptomatic forms of the disease, any of the Formulæ for those medicines in the Appendix may be adopted.

8. When the affection presents an idiopathic, which is comparatively rare, it is most commonly owing to a weakened state of the digestive organs, with, perhaps, an altered sensibility of the nerves, and a disordered state of the secretions of the stomach. In these cases, the combination of vegetable tonics with alkalies, and attention to the alvine secretions and excretions, are chiefly to be attended to. The treatment of cases of the affection induced early in life from habit, will be unsatisfactory, or without avail, until the cause is removed; but it differs in no essential particular from that now stated. In many cases the pernicious habit has commenced with early puberty, and, as well as in the cases associated with chlorosis, hysteria, pregnancy, and irregularity of the menstrual discharge, is evidently dependent upon the state of the uterine functions. (See CHLOROSIS, MENSTRUATION, &c.)

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ARTERIES, THEIR DISEASES.—SYN. *Aprnpla*, Gr. *Artéria*, Lat. *Artere*, Fr. *Ène Schlagader*, Pulsader, Ger. *Arteria*, Ital. *Artery*, Eng.

1. The morbid conditions of arterial vessels cannot be appreciated, either in respect of their causes, symptoms, or consequences, unless their organisation and connections with other systems of the frame be clearly understood. It does not fall within my limits to notice all the connections which the vessels present with other parts of the body; but there are a few to which I will briefly allude, as most material in the causation

of their diseases, and of certain sympathetic affections with which these diseases are related.

2. I. ORGANISATION.—The arterial tubes are essentially constituted, 1st, Of an external and adventitious tunic, consisting of a very delicate and condensed cellulo-filamentous tissue. This tissue is never infiltrated by serum, nor loaded by fat; and possesses the greatest degree of resistance of all the other coats of the vessel. 2d, Of a proper coat, consisting of fine circular fibres placed closely together, and forming a strong tissue of a dun yellowish colour. The nature of this tissue has been a matter of much dispute with pathologists. It certainly does not possess the physical and chemical properties of the fibres of voluntary muscles, from which it chiefly differs in being much more close in its structure, and more elastic and fragile than they. It more nearly approximates to the fibres of involuntary and hollow muscles, as those of the intestinal canal. 3d, Of a very delicate cellular tissue, like a fine pellicle, the second cellular tunic of HALLER, interposed between the fibrous or proper coat and that next to be described. It is in this fine membrane that the minute vessels supplying the arteries, and which proceed from the adjoining parts, terminate; and here also the ultimate distributions of the arterial nerves may be supposed to ramify, although they cannot be clearly traced further through the coats of the vessel than the proper fibrous tunic where I have distinctly followed them. This is the most vascular of the tunics strictly constituting arterial vessels; and one in which many of those changes which will fall under consideration commence. 4th, Of an internal membrane, presenting no linear or fibrous structure, semi-transparent, more readily detached from the one next to it in the longitudinal than in the transverse direction, and fragile. This delicate membrane is not possessed of vessels carrying red blood in the healthy state, but it is penetrated by minute red vessels when inflamed. It lines, with scarcely any perceptible modification, the canals of all the vessels conveying red blood, and the cavities of the heart.

3. The arterial vessels thus formed are surrounded by a sheath of loose cellular tissue, more or less abundant in some parts than in others, permitting the vessels to accommodate themselves to their varying state of dilatation, constriction, &c., and transmitting the vessels which are employed in their nutrition. The elastic properties, also, of the proper coat of the vessels, serves also to accommodate their capacity to the state of the circulating fluid; and as it is generally supposed that they are in a certain degree of distension during life, owing to the quantity of blood constantly being impelled through them by the heart's contractions, so it is believed that the contractions which they display on the removal of this fluid is at least partly owing to the abstraction of the distending cause.

4. No trace of longitudinal fibres can be detected in arteries. The elastic properties which they present in the direction of their axis, when extended beyond their natural limits, and their retraction upon their division, are chiefly owing to the dense cellular coat immediately surrounding the proper fibrous structure of the vessel. The different degrees of tenacity presented by the various structures composing the parietes of these

vessels, acting conjointly with the elasticity of the proper coat, have been considered by many as sufficient to account for the absence of hæmorrhage after laceration of these vessels. Doubtless these circumstances contribute, but I conceive that they are insufficient of themselves to account for this and other phenomena, which will be noticed in the sequel.

5. The arteries are surrounded by the ganglial nerves, which form a reticulum around them; and from this reticulum very minute fibrillæ are given off, and dip into their fibrous tunic. This disposition of the ganglial nerves on the arteries ought to be kept in recollection when we enquire into the functions and diseases of the latter. How far it is necessary, not only to the discharge of the most manifest actions which the arterial system performs, but also to those changes which the blood undergoes in disease, and to the assimilation of the chyle, and other absorbed fluids, I have ventured to state in the article on the Pathology of the Blood. It is evidently to the very intimate connection of this class of nerves with the arteries, and the effects resulting therefrom, that we must impute those changes, whether functional or organic, which take place in the latter, and which influence the state of the blood, and the circulation through them. (See the Author's *Appendix to RICHERAND'S Physiology*, p. 556. 613.)

6. II. NERVOUS AFFECTIONS OF ARTERIES.—II. CLASS, I. ORDER (Author).

7. There is sometimes disorder referrible to a particular artery, or arteries, evidently depending on an affection of the nerves supplying them. Of this description are, 1st, Neuralgia of the arteries; 2d, The violent pulsations sometimes felt in a large arterial trunk. 1st. LAENNEC admitted the existence of *neuralgia of arteries*, and considered it to be characterised by acute pain in their course, with increase of their pulsations and the bellows sound; and to be independent of inflammation, as shown by the sudden accession and remission of the symptoms, and their periodic recurrence. That this affection is sometimes connected with irritation, or with an inflammatory state of its nutritious vessels, may or may not be the case; but it is certainly not always so connected.

8. 2d. *Violent pulsation of arteries* is more commonly observed unaccompanied with excessive pain. In these cases a loud bellows sound is often heard in all the principal arteries, particularly those in which the increased pulsation is felt. This affection generally supervenes and disappears suddenly in nervous and debilitated persons, particularly after large losses of blood. Morbid anatomy has not as yet thrown any light on its nature; and therefore we can only refer it to some peculiar influence exerted by the nerves supplying the vessels thus affected, and probably depending originally upon the state of the vital energies of the frame. It is sometimes associated with hypertrophy of the heart. In this case, it is in a great measure to be imputed to that disease.

9. *Treatment of these affections.*—When neuralgic pain is felt in the course of arteries, and is quite unaccompanied by inflammation, the same treatment which is recommended in the article on the *painful affections of Nerves* may be adopted. After morbid secretions and intestinal coliculi have been carried off by purgatives,

tonics combined with antispasmodics may be employed. The preparations of iron, the sulphate of quinine, ammonia, camphor, alone or combined with opium, colchicum, belladonna, or prussic acid; the external application of the acetate or muriate of morphine, or the cyanuret of potassium, &c. may be tried. In the cases of inordinate pulsations, unassociated with pain of the arteries, attention to the alvine secretions and excretions, and the use of tonics and antispasmodics, will generally be productive of advantage. As these functional disorders are generally consequent upon disturbance of some internal organ or part, sometimes a distant or remote effect of pre-existing disorder, the seat and nature of such disturbance should be investigated, and the treatment directed accordingly. In all such cases, residence in a dry and salubrious air, occasional change of air, gentle and regular exercise, and a light and nutritious diet, will be of much service, (see *Art. AORTA*, §2—6.)

10. III. INFLAMMATION OF ARTERIES.—SYN. *Arteritis*, or *Arteriitis*; *Artereitis*, HILDBRAND. *L'Artérite*, Fr. *Pulsader*—, *Arteri*—, *Schlagaderentzündung*, Ger.

CLASSIF. III. CLASS, I. ORDER (Author, see *Preface*).

11. DEFIN. *Great and tumultuous vascular excitement, palpitation, anxiety, sense of heat and throbbing in the course of the principal arteries, followed by collapse of the vital energies, and occasionally by gangrene of a limb.*

12. This disease was not entirely unknown to the ancients, as ARÆTUS makes mention of inflammation of the aorta. But notwithstanding the incidental notice which was taken of inflammation of arteries by MORGAGNI, and BOERHAAVE, and afterwards by GRANT, the attention of the medical practitioner was never directed to the subject, until J. P. FRANK noticed it in a particular manner. It is, therefore, to the last-named author that we are chiefly indebted for the numerous researches of pathologists, respecting it in modern times. Since the appearance of FRANK'S work, arteritis has received due notice from TESTA, KREYSIG, REIL, BAILLIE, BURNS, CORVISART, SCHMUCK, PORTAL, SCARPA, HODGSON, TRAVERS, RIBES, LAENNEC, BRESCHET, DALBANT, VAIDY, BERTIN, BOULLAUD, GUTHRIE, TROUSSEAU, and several others, and it is now generally recognised as a specific and most important disease, sometimes occurring primarily, occasionally consecutively and conjoined with other diseases, by no means of rare occurrence, and, in whatever form it presents itself, always threatening the most serious consequences.

13. *PATHOLOGY OF ARTERITIS.*—Arteries, being composed of distinct tissues, may be supposed to be liable to all those kinds of inflammatory action, to which each of their constituent parts are most disposed. However frequently inflammatory action may originate in one rather than in more of the coats of an artery, it seems seldom to continue thus limited, but soon affects the rest to a greater or less extent. It may even seize simultaneously upon all the coats; but this is, I think, of comparatively rare occurrence. The individual tissues of an artery most frequently inflamed, in a primary manner, are the internal membrane of the vessel, and its connecting cellular tissue.

the air from the lungs, prevent its renewal, or abstract that constituent of it which is requisite to the respiratory functions. Authors have, however, included, under the head of asphyxies, those states of suspended animation which proceed from the respiration of deleterious gases: and Dr. Good has comprised under it death or suspended animation from lightning and from intense cold. In every case of the action of deleterious gases, of lightning, and of intense cold upon the system, the respiratory organs, although one of the channels for the action of the latter, are not the first to have their functions arrested. The action of all these agents is primarily exerted upon the ganglial and nervous systems; and, owing to their effects upon these systems, the function of the brain, of respiration, circulation, &c. are subsequently abolished. As the action of the greater number of deleterious gases, when respired, is similar to that of other irritating and narcotic poisons, I shall consider them under the head of gaseous poisons (see Poisons). When, however, they are of such a kind, or are present to such an extent, as to irritate violently the larynx, and, by exciting spasm of it, to exclude the air, or so as to displace, and to occupy the room of, the respirable atmosphere, their action is similar to other agents primarily occasioning simple asphyxy: and they therefore require no further notice than by adding them as causes of this state. In respect to the influence of cold and lightning upon the frame, it may be observed that, although exciting and concurrent causes of asphyxy, and producing this, with other changes in the vital functions, but in very different ways, they act directly upon the nervous system, and give rise to asphyxy only secondarily; and, like the more poisonous gases, chiefly through the medium of this system, particularly that part of it which presides over the functions of the brain and heart. Their action will therefore fall under different heads.

4. I. CAUSES. — Asphyxy takes place in a primary and simple form, from whatever excludes, or prevents the renewal of, air in the lungs of a healthy person, or consecutively upon other affections or diseases, especially those affecting the nervous system, and particularly the respiratory class of nerves. In the former state of the frame it is an *idiopathic* or *essential* affection; in which light it will be chiefly viewed in this place: in the latter it is *symptomatic*, or rather one of the modes in which disease terminates life. These states of asphyxy may proceed, *first*, from a primary cessation of the mechanical phenomena of respiration, and, *secondly*, from a primary default of the chemical changes which take place during the respiratory actions.

5. To the first of these is to be referred the asphyxy which depends upon inaction of the respiratory muscles (A.); and (B.) upon deficient expansion of the lungs, the inspiratory muscles performing their functions. A. Deficient or impossible action of the inspiratory muscles proceeds, 1st, from mechanical obstacles applied to them, as in the instances of death occasioned by earth falling upon the trunk of the body, and pressing it so strongly as to prevent them from expanding the thorax: 2d, from deficient or interrupted influence of the nerves supplying these vessels, as from injuries or division of the pneu-

mogastric nerve; injury to the pressure upon the medulla oblongata, or spinal chord, either from fracture or dislocation of the spine, particularly of its cervical portion; and from the paralysis of the nervous system occasioned by a stroke of lightning, or any other cause abolishing its energy: and, 3d, from want of activity, or deficient irritability of the inspiratory muscles themselves, as from the benumbing influence of cold, and the suspended animation of new-born infants.

6. B. The asphyxy which proceeds from a deficient expansion of the lungs, is generally owing, 1st, to mechanical impediments, as the passage of some of the abdominal viscera through the diaphragm, the accumulation of fluids in the pleura, or similar causes: and, 2d, from paralysis of the nervous energy of the lungs, as in cases of death from cold, from lightning, from various poisonous gases, &c.; whereby the vital expansibility of the organ is abolished, along with the other respiratory actions.

7. The second class of causes, or those which act by impeding or abolishing the chemical changes effected by respiration, may be referred to two heads: — 1st, Those which present a mechanical obstacle to the entrance of air into the lungs, as strangulation; submersion; the introduction of foreign bodies into the larynx, trachea or even the large bronchi: and, 2d, Those which consist of a deficiency of respirable air, as a too rarified atmosphere, or the presence of azote, hydrogen, carburetted hydrogen, protoxide of hydrogen, or indeed of any of the deleterious gases. It is evident, however, that asphyxy is often occasioned by the combined operation of more than one of its proximate causes. Thus it may proceed from paralysis of the respiratory muscles, and of the nervous energy of the lungs themselves; and hence be characterised by abolition of the respiratory efforts, by deficiency of the expansive power of the organ, and by arrest of the chemical changes which take place during respiration: and, on the other hand, several of the remote causes act by individually producing more than one of the pathological conditions now specified.

8. II. *Characteristic phenomena of Asphyxy.* — When asphyxy takes place slowly, especially from causes which interrupt the nervous influence actuating the respiratory muscles, it commences with greater or less difficulty of elevating the thorax; anxiety, with urgent desire to inspire, and constant attempts to fill the lungs, giving rise to continued gaspings, or quick, short, and imperfect respiratory efforts; pandiculation; vertigo; failing of consciousness and sensation; sometimes to convulsive movements both of the limbs and trunk, followed by immobility of the parietes of the thorax and abdominal muscles, weak and languid pulsation of the heart, and absence of pulse at the wrist; the face is coloured, livid, tumid, injected, and its veins distended; the hands and feet, as well as the face, present a reddish violet hue; and the cutaneous surface patches of a similar tint. At last the circulation is entirely arrested, and asphyxy is complete. The animal temperature, however, and the absence of rigidity of the muscles, continue for a long time afterwards, — almost always for a much longer period than from death under other circumstances, and from other proximate causes.

9. These phenomena vary, particularly as respects the rapidity of their progress, according to the causes whence they proceed, and to the extent to which air is excluded from the lungs. Where no obstacle to the action of the inspiratory muscles is present,—the obstruction to respiration existing in the air passages,—the efforts to renew the air in the lungs are much more convulsive and laborious. The anxiety is extreme, but of short duration, and rapidly followed by abolition of consciousness, voluntary motion, and of the functions of circulation. In this case the description of SHAKESPEARE is physiologically accurate:—

"But, see! his face is black and full of blood;
His eyeballs further out than when he lived,
Staring full ghastly, like a strangled man;
His hair upreared; his nostrils stretch'd with struggling;
His hands abroad display'd, as one that grasp'd
And tugg'd for life, and was by strength subdued."

10. In cases where asphyxy arises from a sudden abolition of the nervous influence of the respiratory muscles, as from "injuries inflicted on the medulla oblongata, &c., or when the trunk of the body is so compressed as to prevent all action of these muscles, but particularly when it proceeds from the former cause, the phenomena supervene and succeed each other with great rapidity; but generally in the order in which I have enumerated them, excepting that all respiratory efforts are instantly suppressed. In drowning, however, the progress of the symptoms are less rapid and somewhat different, as will be shown in the sequel.

11. III. The duration of life in cases of asphyxy is very different, according as the causes which occasion it act with greater or less promptness, or more or less perfectly, in preventing the renewal of air in the lungs. In general, the more slowly that abolition of the respiratory function takes place, as in cases of drowning, the longer does the action of the heart continue, although feebly and slowly, even after respiration has ceased; and to this circumstance, as well as to the fluidity of the blood, which is long preserved, is owing the power we possess of recalling the asphyxied to life; the more slowly the state of asphyxy supervenes, the longer the person retains the ability of being reanimated, and *vice versa*.

12. The length of time, however, after which resuscitation cannot be accomplished is necessarily varied by different circumstances; and not only by the causes of asphyxy, and their modes of operation, but also the strength of constitution, age, and previous health of the person, and the manner in which abstraction of air has taken place. Much will also depend upon the changes which the asphyxy has produced in the brain,—the degree of congestion, or the occurrence of extravasation there,—circumstances which, when present to any very considerable extent, more particularly the latter, will generally preclude the possibility of reanimation.

13. IV. *Appearances observed on dissection of asphyxied persons.*—A reddish or violet red hue of the countenance and various parts of the surface of the body, which continues to retain its warmth an unusual length of time after death: this tint does not arise from the position of the body after death; and is chiefly seated in the mucous or vascular tissue of the skin, which, upon incision, allows the blood to escape in a state of fluidity. The eyes are bright and pro-

minent; the mouth sometimes natural, at other times expressive of suffering; the limbs are rigid, and continue in this state unusually long, after having been late in assuming it. The veins and sinuses of the brain generally are filled with a dark fluid or semi-fluid blood; the substance and cavities of the brain are not otherwise materially altered. The base of the tongue is generally full or injected, and even tumified, and its papillæ developed; the mucous membrane of the larynx, trachea, and bronchi, is injected and red—the colour becoming darker as we descend from the larynx to the bronchial ramifications, where it assumes a violet or reddish brown tint. Their smaller branches often contain a little sanguineous frothy mucus. The lungs are distended, rise around the pericardium, and present a brown or blackish brown hue; their parenchyma, when divided, are of a redder tint, but give out, upon pressure, large drops of a thick, fluid, and very black blood. The liver, spleen, and kidneys are gorged with blood, presenting a similar appearance. The veins of the heart are congested; and its right cavities, the vena cava, and other large veins, are engorged with black and semi-coagulated or fluid blood.

14. V. *Theory of Asphyxy.*—It is chiefly to GOODWIN and BICHAT that we are indebted for the near approach which have recently been made to a satisfactory and consistent theory of asphyxy, upon which a rational mode of treatment may be based. The venous blood sent by the right ventricle to the lungs, which contain a diminished quantity of air, is converted into arterial blood, is returned to the left side of the heart, but slightly changed from its venous state, from whence it is propelled through the arteries to the different organs. The consequence of the imperfect changes effected in the blood, owing to the interruption or cessation of the respiratory actions, is imperfect excitation of the most important organs of the body; and in proportion as the blood sent from the left side of the heart is possessed of more of the venous characters, the absence of excitation is more manifest, until, as respects the brain, and lungs particularly, which are the first of all the organs to experience the effects resulting from the circulation of venous blood, a sedative or stupefying effect, but negative in respect of its nature, is produced upon them; as is frequently evinced on the brain in cases where asphyxy takes place slowly, and when the blood sent from the left side of the heart is completely venous in its characters.

15. In tracing the phenomena it will be observed, that the capillary system of the lungs is the first to experience a loss of their vital tone and undergo congestion. This arises from the following causes:—1st, The absence of the usual stimulus of pure air in the air-cells: 2d, The circumstance of their being the first to receive the blood after being returned from other parts of the body fully charged with venous properties: 3d, The cessation of the mechanical actions of respiration; and, with them, of the expansive motions of the lungs themselves: 4th, The arrest of those changes which the blood undergoes from oxygenated air, and the influence of a darker blood than usual upon the pulmonary vessels: 5th, The loss of nervous influence, arising from the sedative effect of venous blood upon the

nervous centres, when circulating in arterial vessels: and, 6th, The circumstance of the systemic capillary vessels retaining their tonicity and power of reacting, for a longer time, upon their contents, when circulating venous blood, than the pulmonary capillaries; consequently the blood is returned by them into the veins, and thence to the right side of the heart to be sent to the lungs, which are the first, from this and the foregoing causes, to experience congestion, and to lose the power of restoring it to the left auricle. Thus it will be seen, that the interruption to the circulation commences in the capillary system of the lungs, in consequence of the stop put to the mechanical and vital actions of this organ; and that the heart, which does not cease to contract until the functions of the lungs and brain have been abolished, no longer is supplied with blood from the lungs; the left side of the heart being thus the *ultimum moriens*.

16. The early and manifest effects of asphyxy on the brain have been fully proved by the experiments of BICHAT. This organ is deprived of its functions, and the comatose state is rapidly and profoundly expressed; the venous blood conveyed to it, chiefly from its negative effects, giving rise to all the phenomena usually occasioned by a narcotic poison. Even the heart itself, although the last of the organs to experience the effect produced by the circulation of venous blood, is soon enfeebled in its action. This evidently arises partly from the abolition of the functions of the brain, and partly, or even in a greater degree, from the circulation of dark blood to the ganglia and nerves, whence the heart derives its action, and to its proper structure. But the experiments of Dr. EDWARDS and Dr. KAY evidently show that the circulation of dark blood does not destroy the irritability of muscles, but that it is a less powerful supporter of this property; and consequently that the irritability of the heart is not abolished, as BICHAT supposed, but only insufficiently excited. Indeed, if this property were destroyed, resuscitation would be impossible.

17. The long continuance of the animal heat after the total cessation of the heart's action can only be explained by the integrity of the vital energies of the frame at the time of the event, by the continued fluidity of the blood, and the circulatory or oscillatory motion of this fluid in the systemic capillary system for a considerable time after the heart has ceased to contract, — phenomena, which have been satisfactorily observed in cases of asphyxy. The patches of lividity, and the dark colour of the surface, depend upon the injection of the capillaries of the surface with dark blood, and the engorgement of the veins. The slow accession of rigidity of the limbs after death is referrible to the longer duration of the animal temperature, and the fluidity of the blood, than in other cases; and to these causes also are to be imputed the possibility of resuscitation after a longer period from the cessation of respiration than in any other morbid condition of the frame. The marked rigidity of the limbs, after the body is quite cold, must be chiefly imputed to the perfect state of the vital energies when asphyxia took place.

18. It has long been observed that the body of an asphyxied person appears to contain much

more blood than that of an individual who has died in a different way. BICHAT explains this by supposing that the organs receiving venous blood, which is devoid of the materials necessary to nutrition, yield all the fluids which they usually furnish without appropriating those which they usually do under other circumstances; so that the quantity of blood is actually increased, particularly in cases where the asphyxy takes place slowly. In proof of the accuracy of this view, it has been stated that, when asphyxy occurs suddenly, and the functions cease rapidly, less engorgement of the venous system and of the lungs is observed, than when death is caused more slowly, as in the case of asphyxy from burning charcoal. Perhaps the quantity of blood in the system seems greater from the circumstance of its fluidity, or rather the absence of coagulation; for when this takes place, the serum of the blood partly escapes into the shut cavities after death, and exudes through the vessels and tissues.

19. From the foregoing, therefore, it may be concluded that the cessation of the actions of respiration, — first the mechanical or muscular actions, next the vital or expansive motions of the lungs, — is soon followed by an arrest of the pulmonary circulation, afterwards by abolition of the nervous functions and influence, and lastly by cessation of the heart's action, in consequence of the blood not being restored to the left auricle and ventricle; the latter of which, however, continues to contract as long as blood is sent to it. Hence, as respects the circulation, first, stagnation, of the blood in the pulmonary capillaries upon the cessation of respiration takes place; next, a deficient supply of blood to the left side of the heart; and, lastly, an accumulation of it in the pulmonary arteries, and right auricle and ventricle, which are no longer able to overcome the resistance opposed to its passage in the congested pulmonary vessels. Thus it will be seen that the left ventricle is actually the *ultimum moriens*, and not the right, as supposed by many. Upon this view of the procession of phenomena in death from asphyxia, our endeavours to restore animation are founded.

20. V. The varieties of *Asphyxia*, in a practical as well as physiological point of view, deserve particular notice. The respiration of several gases is often followed by fatal consequences; but as asphyxy is only one of the deleterious effects they occasion, I have considered them in another place (see *Poisons — Gaseous*). Of all gaseous bodies from which asphyxy may arise, azote and hydrogen alone act simply by producing asphyxy; and they have this effect only when they are present in considerable quantity in the air, or when they are respired for some time. The effects which they produce differ in no respect, in the present state of our knowledge, from those described above.

21. A. *Asphyxy from submersion*. — a. There are various circumstances, both proper to the individual, and connected with the submersion, which will modify the resulting asphyxy, and should be taken into account in our endeavours to restore animation. When a person is immersed in water he is seized with an urgent feeling of anxiety at his breast; his pulse becomes weak and frequent. He struggles to relieve his distress, and thereby

rises to the surface of the water, and throws out some air from his lungs. His anxiety continues to increase, and his pulse becomes weaker; his struggles are renewed with more violence; he rises to the surface again, throws out more air from the lungs, and makes hurried attempts to inspire, and in some of these attempts a quantity of water goes down the throat with the air, and excites cough and spasm of the glottis. These efforts tend to determine blood to the head, which, owing to the impeded state of respiration, partakes of the venous properties; and rapidly induces, from this circumstance as well as from the pressure it occasions, insensibility, loss of voluntary motion, slight lividity of the surface of the body, particularly of the face, loss of pulse, relaxation of the sphincters, and as the body sinks to the bottom, the expulsion of a portion of the air contained in the chest.

22. *b. On-tissection*, nearly the same appearances as those already described are found. In addition to these, a frothy fluid is met with in the trachea, and ramifications of the bronchi, with some water, the quantity of which varies in different cases. From Dr. GOODWYN's very satisfactory experiments, confirmed by Mr. COLEMAN and Professor MEYER, it appears that this small quantity of water enters during the struggles to inspire, and, mixing with the mucous of the bronchi, forms a frothy fluid, insufficient, however, to occasion the fatal changes in drowning. A considerable quantity of fluid is found in the stomach. According to Dr. CURRY, the vessels of the brain are not particularly distended; but there are exceptions to this. Dr. BERGER, of Geneva, found that the air remaining in the lungs had lost nearly all its oxygen. Mr. COLEMAN states that the left ventricle of the heart is never entirely empty, it generally containing about half the quantity of that found in the right ventricle; and that a little blood is also found in the aorta.

23. *c.* In cases where a person, in falling into the water, has been struck on the head and stunned, or is intoxicated, or benumbed with the cold and fright, the efforts at preservation will scarcely be made, and the case will be more completely that of simple asphyxia. In cases of this description the countenance is generally pale. The period after which reanimation may be procured is extremely various—generally from five minutes to three quarters of an hour. Of twenty-three persons recovered from drowning, one had been three-quarters of an hour under water; four, half an hour; three, a quarter of an hour; and the rest for shorter periods. Dr. EDWARDS has very satisfactorily demonstrated that life is more rapidly extinguished by submersion in water of a very low temperature than in that of higher grades, evidently owing to the sedative effects of cold upon the nervous system. When submersion takes place during intoxication, there is greater risk of congestion or extravasation in the brain being superinduced; and if syncope, by the fright attending submersion, occurs, fatal congestion and paralysis of the heart and lungs will chiefly supervene, but in a slower manner than under other circumstances; and, as M. LEROY (*Archiv. Gén. de Méd.* t. xvii. p. 468), supposes, thus admitting of resuscitation at a longer period after submersion.

24. *B. Asphyxy from strangulation.*—When asphyxy is produced by hanging, and if the exclusion of air from the lungs is complete, the following appearances are generally observed:—After loss of sensibility, epileptic convulsions, sometimes slight, at other times marked; and generally attended with erections and emissions; turgidity, suffusion, and lividity of the face, extending to the shoulders, chest, arms, and hands: the eyes are open, projecting, and their vessels injected; the features are distorted, and the tongue thrust out of the mouth; the external muscles of respiration are firmly contracted; the hands are clenched, and the sphincters relaxed. When the air is not perfectly excluded in hanging, the sufferings are prolonged, the engorgement of the head and face is greater, the lungs are less loaded with blood, and the vessels of the brain more congested, than when the air is completely excluded. In the majority of cases of asphyxy from hanging, the lungs contain more air than after death from natural causes, or from suffocation by a pillow when the air is only imperfectly excluded from the lungs.

25. There can be no doubt, that although death is caused by asphyxy in cases of strangulation, as proved by DE HAAEN, MONRO, and others, the interruption which the cord occasions to the return of blood from the head, and the consequent congestion of the brain and pharynx, accelerate death. In some instances, also, there is reason to believe that fracture, dislocation, or subluxation of the vertebrae of the neck is produced in the execution of criminals; but it very rarely, or perhaps never, occurs in cases of suicide by strangulation. To these additional effects upon the encephalon and medulla oblongata is to be partly imputed the want of success in our attempts to restore animation after strangulation.

26. VI. GENERAL TREATMENT OF ASPHYXIA. — The indications which naturally suggest themselves from the consideration of the causes of asphyxia, their mode of operation, and the ultimate results which they produce, are, 1st, to remove the patient as soon as possible from the causes which occasioned the asphyxied state; and, 2d, to restore the function of respiration, and, through it, the circulation. The necessity of fulfilling the former of these is sufficiently obvious, and the means of doing so will necessarily vary with the nature of the cause, which should be instantly ascertained; but without delaying the employment of means to restore respiration.

27. The restoration of the function of respiration is to be attempted by various means, calculated, in the first place, to dislodge the impure air contained in the lungs; secondly, to replace it with pure air; thirdly, to excite the remaining vitality of the nerves and muscles; and, fourthly, to restore the circulation by measures calculated to return the blood from the lungs to the left side of the heart. The simultaneous attainment, as far as may be, of these objects, is to be attempted by a judicious combination of means. *a.* The patient should be placed on his back, in an open air of a mild or somewhat high temperature, of from 65 to 70 deg. of Fahr., with the chest, shoulders, and head slightly elevated. He should be stripped of his clothing, and enveloped in a warm blanket. None but the assistants ought to be admitted into the room. The body should be

placed at a convenient height for the employment of the measures of reanimation. Pressure should then be made upon the breast and abdomen, alternating with relaxation, in such a manner as to simulate the actions of the chest in respiration. By this means the foul air will be thrown out of the lungs; and the restoration of the capacity of the thorax, upon the removal of the momentary pressure, by the elasticity of the costal cartilages, will draw fresh air into the lungs. It will sometimes be of service to apply a hand upon each side of the thorax below the arm-pits, and by gentle shocks endeavour to expel the vitiated air. Whilst this is being performed, bottles of warm water should be placed to the feet, under the knee-joints, between the thighs, and under the arm-pits. Dry warmth is particularly beneficial when applied to the epigastric region. Warm stimulating frictions over the surface should also be employed.

28. *b.* After having used pressure so as to simulate respiration for a few moments, *insufflation* of the lungs is next to be resorted to. This may be performed by the mouth, or by a bellows. When the latter is not at hand, the former must be adopted. The operator having closed the nostrils, and applied his mouth to that of the patient, is to blow forcibly into it, pressing the chest afterwards, in order to expel the air; and again blowing forcibly into the chest, the lungs cannot be inflated in this way, the operator should blow into one nostril, having closed the other and the mouth; a small wooden tube can be procured, this may be used for the purpose, by inserting one end of it into the nostril, and blowing into the other; or the pipe of a bellows may be inserted into it.

29. *c.* *Insufflation* of the lungs by the breath of the operator has been recommended by some in preference to the use of the bellows, on account of the higher temperature of the air thrown into the lungs by the former mode; whilst others prefer the latter method, on account of the purer air furnished by it. I believe that the advantage of the higher temperature of the former nearly counterbalances the disadvantage of less purity. If, therefore, insufflation by the bellows of a warm air could be had recourse to, considerable benefit might be obtained. If the bellows are used, the pipe is to be introduced into one nostril; and, whilst the mouth and other nostril are closed, and the *pomum adami* pressed gently backwards and downwards by an assistant, the bellows are to be opened and immediately closed, so as to throw air into the lungs by a single stroke; after which, allowing the mouth and nostril to open, the chest is to be pressed so as to expel the air: thus air is to be forced in, and again expelled, about fifteen or sixteen times in a minute, so as to simulate respiration.

30. *d.* The external and internal use of stimulants has been recommended by J. P. FRANK and DEVERGNE. Of this class of means, *galvanism* holds the first place; but it is seldom that an apparatus can be procured. When it can be obtained, slight shocks may be directed through the diaphragm or heart; or if an electric apparatus is at hand, as strong shocks of electricity as the machine can furnish may be tried. Whilst we are proceeding with insufflation of the lungs, frictions of the surface of the body, particularly over the chest, on

the insides of the thighs, &c., in order to promote the circulation and the animal heat, should be continued; and the nostrils may be irritated, or touched occasionally with a feather dipped in spirits of hartshorn or of aromatic vinegar. Substances which are likely to increase the coldness of the surface by their evaporation should not be employed by friction. The introduction of warm stimulating fluids into the stomach, by means of a flexible tube and syringe, has been recommended, and may be tried after insufflation of the lungs has been performed for a short time. More advantage, however, will probably accrue from the administration of a clyster of warm spirits and water than from the injection of stimulants into the stomach, unless this can be done with an apparatus admitting of easy application. Tobacco-smoke has also been directed to be thrown up the rectum; but it is a more uncertain remedy than the clyster now mentioned.

31. *e.* *Bleeding* is one of the measures respecting which the greatest difference of opinion has existed. In certain circumstances it is often of great service, and in others detrimental. It is generally proper when the countenance is swollen, injected, or purplish; the veins full or distinct; and the skin reddish, or approaching the violet tint. It is not always, however, possible to obtain blood; but even when we fail in procuring it, the opening which had been made should be carefully closed and bandaged, in order to prevent subsequent hæmorrhage, which may occur when least expected. Bleeding is also often required during the progress of recovery, particularly when the respiration is laborious, the brain loaded or oppressed, and when delirium, the not infrequent attendant on restored animation, is present.

32. *f.* The means now recommended, particularly frictions, inflations of the lungs, and the occasional use of stimulants, should be persisted in for several hours, unless stiffness of the limbs, and other indications of death, present themselves. Convulsive snatches of the respiratory muscles, with gasping, followed by sighing, a more natural respiration, and slight palpitations, are the first signs of returning animation. When the circulation is restored, convulsions sometimes take place, and suddenly destroy the patient. Such seizures may occur even a considerable time after recovery has apparently been effected. The patient should therefore be watched for several days; and if an attack of this kind occur, blood-letting, and artificial respiration during its continuance, may save the patient. *Delirium*, and all the forms of morbid reaction which occasionally appear recovery from asphyxy, require depletions, with the means usually employed to restore the secretions and excretions, and to excite the emunctories to carry off the hurtful materials accumulated in the blood during the state of asphyxy.

33. VII. TREATMENT OF PARTICULAR KINDS OF ASPHYXY.—A. Of asphyxy from submersion. But little, in addition to what has been stated above, need be adduced under this head. The body should be carried from the place of submersion to where means of restoration are to be used, in the recumbent posture, with the head and shoulders elevated; but neither of them bent, or hanging in an injurious posture. The wet clothes are to be immediately removed, the

mouth and nostrils cleansed, and the body placed in warm blankets: this should be done as soon as the body is found, if the weather be cold, and the distance to the place where resuscitation is to be attempted be considerable. The directions given in preceding paragraphs (§ 27. et seq.), are now to be followed. Some advantage will be derived from placing the body in a warm sun, or before a fire, or surrounding it with dry warmth; heated substances may likewise be applied to the epigastrium, the extremities, and insides of the thighs. Where a warm bath can be readily procured, the body may be placed in it, and the temperature regulated to about 98° or 100°. *Animal heat*, proceeding from some of the domestic lower animals or from a healthy person placed by the side of the body, is, especially in the cases of children, a very efficacious mode of resuscitation. But all these means should not interrupt the performance of artificial respiration. The other measures recommended in the foregoing section may also be resorted to, with the exception of *bleeding*, which is seldom beneficial until the circulation has been restored; when it will not infrequently be required, to subdue morbid reaction, in conjunction with other remedies calculated to restore the secretions, &c. (§ 32.)

34. *B. Asphyxy from strangulation* requires the same measures which have been described under the head of *general treatment* (§ 26. &c.), and particularly *bleeding*, which may generally be advantageously performed in the jugular vein. The head and shoulders ought to be raised as high as may be consistent with the means used for resuscitation; and, for a restoration of animation be effected, the usual means of guarding the brain from the ill effects of reaction or congestion, to which this organ is more liable after strangulation than after asphyxy from other causes, are to be put in practice.

35. In cases of asphyxy from *obstruction of the glottis and larynx*, or from substances having passed into this situation, or into the *trachea*, the operation of *tracheotomy* should be resorted to. Several instances of this description have been recorded, wherein it has been successfully performed. In all cases of recovery from asphyxy, the patient should be carefully watched for two or three days, and every appearance of reaction affecting any organ, more particularly the brain, instantly subdued by means appropriate to the circumstances of the case. Pure air, and the use of deobstruent purgatives and diuretics, are generally necessary, in order to purify the circulating fluid, and change it from the unnatural state it had assumed during the asphyxy.

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1. **ASPHYXY OF NEW-BORN INFANTS** is frequently met with, particularly in those who are naturally feeble, or weakened by rupture of the chord or laceration of the placenta, in consequence of sudden delivery, or of the operation of turning, especially when required by uterine hæmorrhage. It is also occasioned by compression of the chord, and a protracted parturition.

2. Besides the absence of respiration and of muscular motion upon delivery, the surface is pale; the flesh and limbs are soft and flaccid; the heat of the body is rapidly diminished, but the circulation still continues, at least for some time. Several cases which are viewed as *asphyxy*, more properly belong to *syncope*, or *loss of blood*, or participate in those states as well as in *privation* of the respiratory actions. This privation may depend upon imperfect circulation in the pulmonary arteries, and through the lungs; or upon inactivity of the respiratory muscles, and torpor of the nerves which supply them, owing to imperfect circulation in the brain; or upon these causes conjointly, which should be taken to distinguish these cases from *apoplexy*; as the states of the vascular system, and of circulation in the brain, and consequently the treatment, which is required in each, are very different.

3. The treatment of these cases consists of deferring the ligature of the chord for some time; of taking care that no blood is lost from dividing it; of enveloping the infant in warm flannel; of holding it near a warm fire, or plunging it in a warm bath, rendered exciting by means of salt or mustard; of removing all obstruction to the passage of air into the lungs from about the throat and mouth; warm frictions of the surface of the chest, with gentle succussion with the palm of the hand on the shoulders; tickling or irritating the nostrils and arm-pits with a feather; dropping a little diluted aromatic, or ammoniated spirit upon the lips; and most particularly inflation of the lungs by the breath of the medical attendant, either blown directly into the mouth, the nostrils being closed, and the trachea gently pressed backwards; or through a curved tube introduced into the larynx, as recommended by CNAUSSIER, and employed by him at the "*Maison d'Accouchemens*" in Paris. This latter method is certainly preferable. Insufflation is to be managed in the same manner, in other respects, as described in the foregoing article. But I think that the breath of the attendant is better suited to infants, than cold air thrown into the lungs by a bellows.

4. **M. DESORMEAUX** complains of his want of success from inflation of the lungs, even when carefully and assiduously employed, and places more dependence upon means calculated to excite the respiratory muscles to contract. For this purpose, he recommends a species of spirit douche, and directs the practitioner to take a mouthful of brandy, and dash it forcibly against the anterior parietes of the chest. He states that this is seldom required oftener than twice or thrice. Mechanical irritation of the nostrils, or exciting

plied to the pituitary membrane, may be cautiously tried; a stimulating clyster may also be thrown up. Galvanism or electricity may likewise be resorted to when within our reach. We should not relinquish our endeavours at resuscitation under two or three hours, or even longer; and, if we ultimately succeed, the state of the infant should be carefully watched for two or three days.

BIBLIOGRAPHY. — Burns, *Principles of Midwifery*, &c. 8th edit. p. 592. — *Gardien, Traité Complet d'Accouchemens*, &c. t. iii. p. 135. — *Desormeaux*, art. *Nouveaux-nés*, Dict. de Médecine, t. iii. p. 153. — *Wilson*, in *Glasgow Med. Journ.* vol. u. p. 237.

ASTHMA. DERIV. AND SYNON. **Ἀσθμα*, anhelatio: from *ἄω*, I breathe; *ἀσθδύω*, I breathe with difficulty. *Susprium*, Celsus, Seneca. *Dyspnœa Spastica*, Auct. Var. *Myspastichea Spastica*, Ploucquet. *Asthma Chronicum*, J. P. Frank. *Asthma Convulsivum*, Baglivi, Alberti, Hoffmann, Sauvages. *Asthma Spasticum*, Juncker. *Pneusis Asthma*, Young. *Asma*, Borsaggine, Ital. *Pousse*, *Asthme*, Fr. *Die Engbrüstigkeit, das Keuchen*, Ger.

CLASSIF. 54. G. Asthma; 3. Order, Spasmi; 2. Class, Neuroses (Cullen). 4. G. Asthma; 2. Order; 2. Class (Good). 37. G. Asthma Convulsif; 4. Order; 4. Class (Pinel). II. CLASS. ORDER (Author, see Preface).

1. DEFIN. Great difficulty of breathing, recurring in paroxysms, accompanied with a wheezing sound, &c. constriction in the thorax, anxiety, and a difficult cough, terminating in mucous expectoration.

2. There are few diseases, the nature of which has been a subject of greater doubt and difference of opinion than asthma. Until the writings of FLOYER, WILLIS, HOFFMAN, ALBERTI, and JUNCKER, directed particular attention to its pathology, it was generally confounded with dyspnœa, being usually denominated intermittent or remittent dyspnœa. By these writers, and more recently by SAUVAGES, CULLEN, PINEL, and GEORGET, asthma was considered as essentially nervous in its nature; and the lesions found upon the dissection of fatal cases viewed as its consequences, and not as its causes. More recently, and even at the present day, among many, it has been considered as a symptom of organic change of either the heart, large blood vessels, or of the lungs, air-tubes, &c. But this doctrine, although generally accurate in respect of *Dyspnœa*, is quite erroneous as applied to asthma.

3. **PATHOLOGY OF ASTHMA.** — The dependence of dyspnœa, not only upon organic lesions of the organs seated within the chest, but upon the form of the thorax, upon diseases of adjoining viscera, and upon the state of the air-passages, is sufficiently obvious. The difficulty of breathing proceeding from these sources may be either continued or remittent; but it never is, whilst the causes on which it depends are in existence, characterised by intervals of perfect ease. True asthma, however, presents intervals of healthy respiration; and although repeated returns of the attack will generally induce some change in the organisation of either the lungs or the principal organs of circulation, yet this is not uniformly the case; and moreover, an attentive examination of the thoracic viscera, in recent attacks, fails of

detecting in them any appreciable change, particularly during the intervals between the paroxysms. The disease has even proved rapidly fatal during the attack, and yet no alteration adequate to account for the symptoms could be detected on dissection. Instances of this description have been adduced by WICHMANN (*Hufeland's Journ.* b. i. p. 18.), PARRY, GEORGET, ANDRAL, LAENNEC, and GUERSENT, and justify the opinions of those who have referred the disease chiefly to the nervous system. In some cases, after repeated returns of the attack, and when they have induced organic change, the intervals are less distinctly marked, consist of remissions merely, and the disease may, at last, pass into confirmed dyspnœa.

4. a. *The structure of the air-passages and bronchi* evidently shows that these parts are susceptible of preternatural or spasmodic constrictions. During 1821 and 1822, when engaged in some researches into the pathology of diseases affecting the trachea and bronchi, I was enabled distinctly to trace muscular fibres throughout those parts, both in man and in the lower animals. The disposition of those fibres, in many of the lower animals, and the mode of their connection with the cartilaginous rings, are peculiar, and beautifully adapted to guard against the contingencies to which they are liable from varying positions and habits of life. Upon those, however, I cannot here enter. About the same time that my attention was directed to this subject (*Lond. Med. Repository*, vol. xxii. p. 418.), the researches of REISSKISSEN of Berlin, and of LAENNEC and CRUVEILHIER of Paris, appeared; and the results, in respect of the structure of the bronchi and larger ramifications of the trachea, upon the whole, agree with what I had observed. It had been denied that the membranous, or any other, part of the air-passages contain muscular fibres. But this was asserted chiefly by those who cannot believe that a part is muscular, unless the fibres are the same in appearance as those which enter into the composition of the muscles of voluntary motion. Other anatomists, who take a more comprehensive view of the conformation and functions of the muscular system, consider, with greater justice, that the muscles which are acted upon by the will, form an order by themselves; and that there is another and a very important order of muscular parts, which are not directly influenced by volition, but which contract from stimuli acting on them, either immediately or mediately, and which present certain peculiarities in respect of the appearances of their fibres, of the mode of their distribution, and of the manner of their connection with internal tissues and organs. Now, the fibres which are discovered in the trachea, and traced to the smallest ramifications of the bronchi, are in every respect similar to other involuntary muscular fibres, in their organisation; in their connection with a mucous surface, forming, in many respects, a tunic concentrically with the mucous coat; in being disposed in circular fibres, surrounding hollow tubes; and in being supplied entirely by ganglial or involuntary nerves. The disposition of the fibres, therefore, which are detected in the air-passages, being altogether similar to that which obtains in other canals, the muscular structure of which is not disputed, as in the alimentary tube and urinary bladder; the organ-

isation of the fibres being also similar; their connection to a mucous surface, and the circumstance of their being supplied with the same order of nerves, being at the same time considered; are we therefore to be surprised that agents affecting either the mucous surfaces thus related to them, or the nerves supplying them, should be followed with analogous effects to those which we observe after the action of agents directed to the mucous surface or nerves of the alimentary canal?

5. *b. The lungs possess a vital power of expansion.*

—The structure of the air-passages, then, would lead us, independently of the results of observation, to infer that the circular fibres are liable to experience, with all other involuntary muscular fibres, a spasmodic constriction; and it evinces, particularly in the conformation of the cartilaginous rings with which the trachea and larger ramifications of the bronchi are provided, a marked provision against an inordinate continuance or degree of this constriction; the rings, by their permanent elasticity, acting as antagonists to the circular fibres, preventing extreme constriction, and at last overcoming long-continued spasm, particularly in those larger branches, the inordinate constriction of which might have the effect of excluding the air from a very large portion of the lungs. In the larger ramifications of the bronchi, the muscular fibres connecting the extremities of the cartilaginous rings are thus antagonised by these rings; but, in the smaller ramifications, where the rings cease to be detected even in the imperfect forms in which they there exist, and where the fibres are perfectly circular, the only provision which can prevent an inordinate constriction of those fibres, is in the structure of the lungs themselves, which must necessarily undergo a change in bulk, and become more condensed by this constriction, in those parts, at least, to which the spasm extends; unless we believe that the lungs, like various other organs, are endowed with an expansive power,—a power which physiologists and pathologists have too much overlooked in their exposition of the healthy and morbid actions of the animal economy.*

6. The mechanism of the expansive power is so little understood, and generally so insufficient for the explanation of this phenomenon, that we must refer chiefly to the vital actions of the part, which must necessarily depend on the energies of the body generally. The expansile action of the penis, nipple, heart, uterus, &c. cannot be explained by their organisation only: it is manifested to us only during life, and the perfection as well as imperfection of this action are always accordant with the degree of vital energy with which these organs are endowed.

7. I have long since had occasion to remark that the motions and functions of the lungs (*Physiological Notes*, &c. to M. RICHERAND's *Physiology*, 2d ed. p. 628.) have been too generally, and exclusively referred to the mechanism of the se-

* That the lungs, however, really possess this property, may be inferred from the permanent elasticity of their structure, which continues for some time after death; and which is still more marked during life, as shown by exposing the lungs of a living animal. This state may be, with propriety called the vital expansibility of the lungs, inasmuch as the degree of this state is chiefly dependent upon the vital energy of the system, and partly on the regular organisation of the lungs themselves.

spiratory organs, and to chemical changes produced in the lungs, to the neglect of a much higher influence, always controlling, modifying, or altogether changing, the subordinate powers to which their functions have been thus referred. That the vital energies of the frame are most powerfully exerted in the lungs, through the medium, especially of the organic nerves with which they are provided, must be evident to all who will contemplate the nature and extent of the changes constantly taking place in these organs upon the blood circulating through them; and the relation which subsists between their functions and the vital energies of the system generally. Now, it does appear to me that there exists a vital expansion of the lungs independent of that which they experience from atmospheric pressure, and from following the dilated parietes of the thorax during inspiration. In experiments upon living animals, where the walls of the chest have been opened, the lungs are observed to swell and contract alternately. This fact, which was first insisted upon by M. Roux (*Mélanges de Chirurgie*, p. 87.), has since been duly appreciated by PRUS, LAENNEC, and a few others. Even in cases where the portion of lung has protruded itself after a wound of the chest,—a circumstance which could only occur from active expansion of the lung itself,—this portion has been, although ~~it is~~ naturally placed and subjected to the pressure of the atmosphere, observed to dilate during inspiration. The not infrequent occurrence of ossification of the cartilages of the ribs in old persons, and consequent perfect immobility of the ribs, even without any evident dyspnoea, furnishes another proof of the inherent expansibility of the lungs: for without having recourse to this vital property, we cannot explain the performance of the actions of inspiration and expiration by the diaphragm alone.

8. This vital property, therefore, with which the lungs, in common with some other organs, seem to be endowed, together with the disposition and elasticity of the cartilaginous rings of the bronchi, furnishes an antagonising force to the unnatural constriction of the tubes from spasm of their circular fibres; and, while it serves to explain the natural functions of the organ, with their modifications from the various influences to which this property is subjected, is one of the sources to which we are to impute some of the diseases, and more especially the one under consideration, to which the lungs are liable.

9. Having thus shown, from the structure of the air-passages that they, in common with all other hollow tubes of the body, admit of spasmodic constriction, and that they also present a provision against the undue extent or continuance of this state, I should further remark, that a close observation of the phenomena of disordered respiration is sufficient to convince us that they frequently experience this state, owing to the operation of certain causes acting either directly on the mucous surface of the tubes, and impressing the nerves terminating in it, or originating in and irritating the nerves themselves, either at their origins or in their ramifications and connections.

10. I. SYMPTOMS AND HISTORY OF ASTHMA.—The premonitory symptoms of this disease are languor, sickness, flatulency, and other dyspeptic

disorders; heaviness over the eyes, and headach; uneasiness an anxiety about the precordia, with a sense of fulness and straitness in this region and in the epigastrium. In some cases pain is complained of in the neck, with uncommon drowsiness and stupor. * It is also often preceded by costiveness and inefficient calls to stool.

11. *A.* The invasion of the attack of *spasmodic asthma* is generally soon after midnight, or about one or two in the morning, and during the first sleep. The patient wakes suddenly from a sense of suffocation. He feels a most distressing tightness at his chest, with great anxiety, difficulty of breathing, and impediment to the free admission of air into the lungs. He assumes with eagerness the erect posture, and cannot bear the least incumbrance about the chest. The breathing is wheezing, interrupted, and laborious. The shoulders are raised, the elbows directed backwards, and every effort made to enlarge the thorax. Owing to the interrupted circulation through the lungs and heart, the countenance, which was at first pale and anxious, becomes, particularly in plethoric habits, red or bloated, and covered with perspiration. The eyes are prominent, and the conjunctiva injected. A considerable quantity of pale urine is usually passed at the commencement, or previous to the accession, of the paroxysm; and the lower extremities are usually cold. The pulse is generally accelerated, weak, irregular, and often intermittent. During the fit, the patient has commonly an instinctive desire for cool fresh air, which always revives him. A small or close room is offensive, and all warm substances given internally increase the flatulency of the stomach and bowels, and aggravate the symptoms. When the fit has continued from half an hour to one, two, three, or even four hours, it leaves the patient; and his respiration, pulse, and feelings assume their natural state.

12. This is the common course of a first and moderate attack of the disorder. Sometimes the patient has but one such fit; but more generally a slight constriction of the chest is felt through all the succeeding day, and the paroxysm returns at the usual period of the night; and this continues for three, four, or even seven days; when the patient is at last altogether relieved from the attack. The disease may be suspended for a month, or several months; but it is liable to recur from changes of air, errors of diet, and from the operation of the other causes productive of it.

13. In some cases the attack is more severe from the commencement, and continues, with slight remissions for several days, accompanied with a harsh suffocative cough, great distension of the abdomen from flatus, and more or less of the symptoms which characterise the complaint in the severer states resulting from repeated attacks.

14. When asthma once seizes on the system, it seldom fails of recurring, though the intervals between the paroxysms are of very uncertain duration. In many cases it recurs periodically every ten days or a fortnight. Sometimes the attack returns at the full and change of the moon, or at one of those periods only. It has been observed to recur in females just after the menstrual discharge, or to precede this evacuation. Persons who have become subject to the disease

seldom escape an attack in the spring and autumn.

15. After repeated seizures, the disease often assumes the most violent and distressing features; the difficulty of breathing in the fit amounts to the utmost degree, and is attended with the greatest tightness over the whole chest, the patient feeling as if he were bound with cords. His anxiety at this period is inexpressible, and he labours in respiration as if every moment would be his last. Severe vomiting also frequently occurs. The matter discharged is slimy and frothy, or of a greenish yellow colour. He is subject to palpitations and faintness; and cool fresh air becomes absolutely necessary. About this period a loose stool sometimes takes place. The eyes are prominent, the face sometimes pale, sometimes high-coloured, bloated, or livid: the nose and ears are cold; the face, neck, and chest, covered with perspiration. The pulse is generally extremely weak, irregular, and even intermitting: there is often much difficulty of swallowing. The patient can scarcely speak, cough, or expectorate, and the stomach and bowels are much distended with flatus. As the paroxysm abates, the cough becomes freer, and is attended with the expectoration of a little viscid mucus; and, in proportion as the cough and expectoration increase, the distressing symptoms abate; this evacuation, which had been retained by the spasm of the air-vessels, indicating a solution of the spasm and a freer access of air to the cells of the lungs. An easy and free expectoration, particularly if it be accompanied with softness and moisture of the skin, and a sediment in the urine, is a certain indication of the subsidence of the attack. Sometimes when the paroxysm is unusually long, the patient experiences only a single occurrence of it during the attack.

16. *B.* The *Humoral* form of asthma is generally gradual in its accession, and attended by extreme oppression, a suffocative cough, and a copious secretion and expectoration of mucus from the commencement of the seizure (§ 11.). It is sometimes the consequence of repeated attacks of the preceding variety; and is generally more severe and of longer duration than it, owing to the accumulation of viscid mucus in the air-vessels conspiring with the spasm it occasions to aggravate the symptoms. There are also less perfect intervals of ease in this form of the malady, than in the *spasmodic*. After the subsidence of the patient's sufferings during the first night of the attack, and while the expectoration is easy and copious, the lungs still continue irritable through the day, and the respiratory function embarrassed from the slightest causes. At the approach of night, the fit recommences with the usual symptoms, and the night is passed nearly as the former. On the third day the remission is more complete, there is some additional expectoration, and bodily motion is performed with less distress, but still with great inconvenience. After the paroxysm has been renewed in this manner for three or four nights, or for a longer period, sometimes for several days or even weeks, — for the duration of an attack varies much, — the expectoration and cough are more easy and free, the daily remissions become more perfect, and the strength of pulse and vigour of action increase.

17. When the chest is examined by the ear or

stethoscope, the sound of respiration is weaker during the fits, than in the intervals, but it is seldom altogether suspended in certain points of the chest; it is attended by a sonorous rattle, flat or sibilous, imitating the chirping of birds, the note of a violoncello, or the cooing of the wood-pigeon. With this there is frequently intermixed a mucous rattle; but this conveys the impression of being produced by a thinner fluid than the mucus of common catarrh. In the intervals of the attacks, these various species of rattle exist, but in a much less degree. The respiratory sound is louder than during the paroxysms: sometimes it is almost puerile. If the complaint have occasioned dilatation of the bronchi, the respiration assumes more or less the character of the variety called bronchial; in all cases it varies in intensity at different points of the chest, and these points change their situations from day to day (LAENNEC). The chest generally sounds well throughout the attack, upon percussion.

18. I have stated (§ 16.), that the humoral form of asthma is often consequent upon repeated attacks of the spasmodic; but this latter may also occur, although rarely, after the former; or the attacks in some persons present an evident complication of both forms of the disease. The stomach and bowels are extremely liable to disorder in asthmatic persons, particularly in those subject to the spasmodic form of the disease. Colic pains, flatulence, loss of appetite, an irregular state of the bowels, and a disturbed, impaired, and unrefreshing sleep, generally harass the asthmatic patient, even in the intervals between the seizures. In females, the menses are generally impaired or irregular, and an attack often precedes the period of the menstrual discharge, the supervention of which generally acts as a crisis of the attack.

19. Symptoms of fever are not essential to the disease, though they often occur, especially when the humoral asthma, or an attack of catarrh, is complicated with the convulsive. Icteric fever, colliquative diarrhoea, faintings, palpitations, vomitings, coldness of the extremities, swelled legs, and other dropsical symptoms, are common in the last stage of the disease, and indicate organic changes in the substance of the lungs or heart, with obstruction to the circulation, in these organs, and effusion of fluid in the chest,—results, however, which can only be ascertained with precision by means of auscultation and percussion.

20. *C. Terminations.*—An attack of asthma generally terminates in one of three ways:—1st, By a return to the healthy function: 2d, By inducing further lesion; in which it either disappears, or becomes complicated: and, 3d, In death. On each of these I shall offer a few remarks.

21. *a.* Although the paroxysms of asthma frequently terminate in a return to the healthy functions, a perfect immunity from future attacks can rarely be procured. Yet these attacks may be frequent, severe, and of long duration, recurring for a long series of years; the patient, notwithstanding, arriving at a very advanced age, before a fatal issue takes place. But they often produce the following organic lesions.

22. *b.* The most common consequences of the disease to which I may now advert, are, chronic inflammation and dilatation of the bronchi the different forms of emphysema and oedema;

of the lungs; hæmoptysis; tubercular formations, with which asthma may also be associated from its commencement; enlargement, and dilatation, &c. of the cavities of the heart; effusions of fluid in the pleura or pericardium; and wasting of the heart, or polypous concretions, within its cavities. As the reader will find all those lesions treated of under their distinctive heads, I shall here only remark respecting them, that, when they supervene to asthma, many of the distinctive characters of this disorder entirely disappear in those of the superinduced disease, and the lesions of the respiratory functions assume the distinctive features of chronic, continued, or remittent dyspnoea. Severe attacks of asthma may also terminate in congestions or effusions within the head, giving rise either to epilepsy, coma, or apoplexy.

23. It was already remarked, that auscultation and percussion furnished merely negative information in the different forms of asthma. But this information is still important, inasmuch as it intimates the non-existence of any of the foregoing organic changes; and, when they do exist, those means of diagnosis enable us not only to recognise them, but also to ascertain with precision their nature, progress, and extent, and thus to form an accurate diagnosis and prognosis in respect both of the disease and of the consecutive organic changes.

24. *c.* When the disease tends in death, this event is brought about generally by superinducing some one of those changes, or by referred to as terminations of the disease, or of those lesions, with which it is frequently associated (§ 22.). Death may, however, occur, but much more rarely, from the severity of the attack; the requisite changes not being effected on the blood by respiration, owing to the obstructed state of the air-vessels, either from spasm or the accumulation of viscid mucus, or from both, whereby the nervous centres are supplied with blood unsuitable to their functions, and the heart ceases to contract with sufficient energy to preserve the circulation in a requisite state of activity through the lungs and brain.

25. *D. The appearances after death* may be inferred from what has already been stated. These appearances are rather the consequences of the disease, than the disease itself; for it is seldom that we have an opportunity of examining the body in retent and uncomplicated cases of asthma. Where, however, this has been done, the lesions, even when any have been detected, have been insufficient to account for the disease, WILLIS records a case of protracted asthma, in which no morbid appearance could be detected; and similar cases have occurred to LAENNEC, ANDRAL, CRUVEILLIER, BOUILLAUD, JOLLY, and others. FERRUS, after extensive experience, states that he has been unable to detect any lesions which can be attributed to uncomplicated asthma. The changes which have been noticed, therefore, by authors, are to be viewed chiefly as accidental occurrences, or associated maladies; and, perhaps, more frequently as the remote results of repeated or protracted attacks. The appearances usually observed in fatal cases are the same as have been described (§ 22.).

25. II. VARIETIES OF ASTHMA, AND OF THEIR PATHOLOGY.—SAUVAGES has enumerated no less

than eighteen forms of this disease, many of them presenting no modification of the phenomena constituting the disease, but merely peculiarities as to cause, particularly as respects the occasional causes. Several of his varieties, also, strictly belong to the more generally symptomatic complaint to which the term *Dyspnoea* is usually applied. The varieties of idiopathic asthma, according to CULLEN, are the *SPONTANEOUS*, *EX-ANTHEMATIC*, and *PLETHORIC*. Dr. BREE, who has given a comprehensive account of the disease, has divided it into forms which have reference chiefly to the doctrine which he has espoused respecting its pathology. He assigns to it four species: — 1st, Asthma produced by the irritation of effused serum in the lungs; being its most common form: 2d, That occasioned by the irritation of aerial acrimony in the lungs: 3d, That dependent on irritation in the stomach, or some of the abdominal viscera: and, 4th, That dependent upon habit. Dr. YOUNG has adopted a similar arrangement.

26. M. LAENNEC has given a simpler view of the disease, and assigns it two forms, viz. asthma attended with *puerile respiration*, in which the vital expansibility of the lungs is increased, from a temporary augmentation of the want of the system for respiration, occasioned by some unknown modification of the nervous influence; and *spasmodic asthma*, from spasmodic constriction of the air-tubes. LAENNEC has divided the disease into the *dry* and *humid*; but he has encumbered these two species with nearly as many varieties as have been assigned by SAUVAGES. The *dry* or *nervous asthma* he subdivides into the simple, metastatic, phlegmatic, vaporose, and organic, — a refinement which is neither founded in nature, nor can be available in practice; for a simple nervous asthma may be induced by injurious vapours, or by repelled eruptions, and hence we have the first variety produced by either his second or fourth; and the second, or the phlegmatic nervous asthma, may proceed from the same varieties. His fifth variety is certainly not admissible under asthma, unless as a consequence of the disease, but falls more properly under dyspnoea, either in its continued or remittent forms. The *humid* or *common asthma* he subdivides into the simple, plethoric, and atonic, — a division much more accurate than the foregoing, but still objectionable, inasmuch as it is impossible to draw any line of demarcation between them, and as the three varieties insensibly pass into one another.

27. By the great majority of authors who have written on the disease, it has been viewed simply in respect of its *IDIOPATHIC* and *SYMPTOMATIC* forms; both, however, presenting modifications resulting from peculiarity of causes, and the circumstances of the patient, but insufficiently marked to constitute distinct varieties. In the following observations I shall observe the same distinction, and divide the *IDIOPATHIC* FORM of the disease into, 1st, The *nervous asthma*; 2dly, The *primarily spasmodic asthma*; and, 3dly, The *pituitous* or *humid asthma*.

28. 1st, *Nervous Asthma*. The asthma with puerile respiration, *Laennec*. — CHAR. *Anhelation from a feeling of want of a more complete respiration than the patient enjoys, the pulmonary expansion distinctly taking place with promptitude,*

completeness, and uniformity, so as to furnish a general puerile sound on auscultation; usually accompanied with a slight cough, and with a free mucous expectoration.

29. This form of the disease was first accurately described by LAENNEC, who pointed out the difference between it and the forms depending on spasm of the air-tubes. In this variety no spasm seems to exist in the smaller air-vessels and cells; for the whole tissue of the lungs is dilated to its full capacity, and with unusual promptitude and completeness, so that the puerile respiration is heard in every part of the chest; whereas in the other varieties the respiration is generally somewhat more indistinct than in health. M. LAENNEC contends, and apparently with justice, that the wants of the system, in respect of respiration, may be exactly measured by the intensity of the respiratory sound; and that the intensity varies much, according to many circumstances, and particularly according to the age of the individual, it being much greater in childhood than in adult life. There is no morbid affection, he observes, which can be more satisfactorily referred to simple disorder of the nervous influence, than this dyspnoea accompanied with puerile respiration. In cases of this kind, the respiratory sound has resumed all the intensity which it possessed in early life. The pulmonary expansion evidently takes place completely and rapidly in all the air-cells, and yet the patient feels the want of a more extensive respiration than he enjoys; and the lungs, although dilated to their utmost, have not, nevertheless, capacity enough to satisfy the wants of the system. This affection is common in persons affected with chronic mucous catarrhs, attended by a copious and easy expectoration; but even in them, during the severest attacks, the completeness with which respiration is performed is quite astonishing. Nevertheless the patient feels oppressed, and requires a more extensive respiration than his organisation allows; the wants of the system in respect of this function being increased beyond the standard of health.

30. In this form of the disease it is not in the small air-tubes that we are to look for its proximate cause, but in the trachea and large bronchial trunks, and particularly in the nervous influence itself; and this will equally hold good even if we adopt the chemical theory of respiration, and refer the affection to an extraordinary want of oxygen in the blood, arising from impeded function of the respiratory mucous surface, owing to the mucous secretion covering it. M. LAENNEC believes, as this species occurs only in persons affected with chronic mucous catarrh, that it can never amount to asthma, without the catarrhal complication. Adults and old persons, he remarks, who have puerile respiration without catarrh, are not, properly speaking, asthmatic; but they are short-breathed, and dyspnoea is induced by the slightest exertion, though when sitting still they frequently experience no oppression whatever.

31. This variety may be considered as depending upon a temporary augmentation of the want of the system for respiration, occasioned most probably by some unknown modification of the nervous influence; and apparently consisting in an expansive action of the lungs increased much beyond the healthy standard. But here a ques-

tion suggests itself, viz. can this augmented action of the lungs be owing solely to the state of this organ, or is it associated with, or partly depending upon, increased activity of the respiratory muscles, particularly the diaphragm? M. LAENNEC states that it cannot be produced at will by a full inspiration; and, therefore, infers that this state of the lungs is a primary condition of them, and not depending on increased inspiratory efforts.

32. From this consideration I am led to infer that, although the vital expansile action of the lungs may be increased in this variety of asthma, it is accompanied with, and much assisted by, augmented activity of the diaphragm, which performs its office more promptly and completely in this variety of asthma than in any other; that instead of the disease being characterised by spasm of the smaller ramifications of the bronchi and air-cells, as in the second variety of asthma, the air penetrates more fully into them than usual; and that, if any spasm exists, it is limited to the trachea and large bronchial tubes; the exalted state of expansion of the lungs, and of function of the diaphragm, being an effort to counteract this morbid condition of the large tubes, and to supply the wants of the system by a more forcible inspiration; the increased rapidity with which the air is thereby made to pass through the strictured canals making more than amends for the diminished calibre of the passage. This form of the disease is frequently symptomatic of nervous affections, particularly of hysteria when the globus hystericus affects the state of the trachea, and of various diseases, in which the blood is imperfectly charged in its circulation through the lungs. But when thus symptomatic, it is often slight and evanescent.

33. 2d, *Spasmodic Asthma*. SYN. Periodic Asthma. Convulsive Asthma, Willis, Baglivi, Boerhaave. Asthma Siccum, Musgrave. Occult dry Asthma, Etmuller. Spasmodic Asthma, Laennec. Dry Asthma, Good.—CHAR. Paroxysms sudden, violent, and of short duration, attended with hard spasmodic constriction in the chest; slight, dry, and difficult cough, and with a scanty expectoration, occurring only towards their close.

34. I stated that the vital expansive action of the lungs was increased in the foregoing variety. In this the ramifications of the air-tubes, and perhaps the air-cells themselves, seem to be unnaturally constricted. The respiration, when examined by the stethoscope, or by the ear merely, is heard either very imperfectly even on the most forcible respiration, or to a small extent only, or its sound may be but little impaired. The chest, during the paroxysm, sounds ill on percussion. These phenomena indicate that there is an imperfect entrance of the air into the air-cells. M. LAENNEC states, that if the patient, after holding his breath nearly as long as he can, breathes quietly, the spasm will often be overcome as it were by surprise, and the entry of the air into the cells will be heard in a clear or even puerile sound. This, and various other circumstances, independently of the proof furnished by the structure of the air-tubes, indicate that the obstruction to the entrance of air into the cells is owing to spasm of the muscular fibres.

35. Dr WILLIAMS believes that spasmodic

asthma may be partial, affecting one lung only, or more than the other; but this is very seldom the case, unless when it is occasioned by, or complicated with, dry catarrh, which is sometimes partial; or when the spasmodic constriction is excited by a collection of a pituitous fluid in some of the bronchi,—a complication of not infrequent occurrence, but falling more strictly under the next form of the disease. Although the paroxysms of the primarily spasmodic asthma are sudden, and generally of short duration, yet the disease is often of long continuance, and may, to a certain extent, become habitual, as shown by Dr. BREE and others.

36. During the spasm, the lungs seem, from an attentive examination of the thorax, somewhat drawn together, owing to the constriction of the air-tubes; and the parietes of the chest, being necessarily pressed inwards at the same time, generally yield a less clear sound on percussion. The serobiculus cordis is also drawn inwards and upwards, indicating the manner in which the diaphragm is affected during the paroxysm. This phenomenon, which was first pointed out by SCHEIDEMANTEL (*Frankische Beiträge*, No. 5.), arises either from the diaphragm being prevented from contracting to its full extent by the spastic constriction of the air-vessels, or from a temporary paralysis of the muscles. That the latter state should take place, is followed in a short space of time by a perfect restoration of action, and that repeated seizures of this description should be always succeeded by a rapid return to the healthy state cannot be admitted by any person who takes an intimate and comprehensive view of the operation of the animal economy in health and disease. That retraction of the epigastrium, and even of the hypochondria, is owing to imperfect descent of the diaphragm from constriction of the air-cells, seems proved by the circumstance, that the pleural cavity is perfectly closed, and forms nearly a vacuum, and consequently the capacity of the thorax cannot be enlarged by the action either of the diaphragm or of the other respiratory muscles, without the expansion of the lungs. But this organ is only imperfectly expanded, owing to the spasm of its air-vessels; consequently the diaphragm either cannot assume its usual place, or does so imperfectly, notwithstanding its efforts to accomplish this end; and the parietes of the thorax are every where pressed inwards, following the retracted state of the lungs themselves, and are only partially dilated after the most energetic action of the respiratory muscles, which at last overcomes the spasm of the air-tubes, as the want of respiration throws the former into spasmodic action, and tends to relax the spastic state of the latter.

37. This condition of the air-vessels, and the antagonising action of the respiratory muscles during the paroxysm, have a necessary tendency to form a vacuum in the thoracic cavity; but this can take place to a very small extent only, as the action of the respiratory muscles is insufficient to overcome both the pressure of the atmosphere surrounding the chest, and the spastic stricture of the air-tubes, as long as this stricture continues in full force. The consequence, however, of this antagonising action and tendency to form a vacuum is, that a larger quantity of blood is drawn into the large veins within the thorax, and

into the venous sinuses and auricles of the heart, occasioning congestion of those cavities, impeding circulation through the lungs, congestion within the head, and inordinate and irregular action of the heart, with various other injurious effects upon the central organs of circulation, as well as upon the cerebro-spinal centres.

38. In addition also to these effects, which take place during the antagonising struggle characterising the paroxysm, rupture of one or more of the air-vessels or cells sometimes takes place, in consequence of the violent action of the inspiratory muscles on the one hand, and the unyielding state of constriction of the air-vessels on the other (§ 136.); and emphysema of the lungs is superinduced, forming one of the most common lesions found upon dissection of fatal cases, and in the opinion of some pathologists the proximate cause of the disease. (See EMPHYSEMA.)

39. 3d, *Common or Humid Asthma*. — SYN. Catarrhal Asthma; Continued Asthma; Humoral Asthma; Ptituitous Asthma. Spitting Asthma, *Floyer*. Asthma Humidum, *Riverius* and *Musgrave*. A. Pneumaticum, *Willis*. A. Humidum, *Baglivii*. Ptituitous Catarrh, *Laennec*. — CHAR. Gradual accession of the paroxysms, which increase in severity, are protracted, and attended with heavy and laborious constriction of the thorax, severe suffocative cough, and with expectoration, often commencing early in the morning, viscid and scanty, but becoming copious, and affording relief.

40. This common form of asthma may present various pathological states and relations. It may, as stated by *Gullen* and *Goop*, be characterised by plethora of the vascular system generally, and of the pulmonary tissue especially, particularly when it supervenes to the suppression of some accustomed evacuation. It may also be associated with a relaxed or atonic state of the exhalants of the bronchial surface, particularly when it takes place after chronic catarrhs, and in aged or phlegmatic subjects; and it may be attended with both these states, namely, with plethora of the sanguineous system, and atony of the exhalant pores of the respiratory mucous surface. Besides these states, it may vary in respect of the acuteness and chronicity of its symptoms and progress; it being either *acute* or *chronic*, or presenting grades intermediate between both.

41. The chief characteristic of this variety of asthma is the copious discharge of viscid mucus accompanying it. But the questions with several modern pathologists have been, whether the phenomena of the disease are to be imputed solely to the accumulation of this fluid in the air-passages, or in part only; and whether spasm of those passages also exist in conjunction with an increased secretion of mucus, or not. I believe that an attentive observation of the phenomena of the disease, with the assistance of auscultation and percussion, — which, however, occasionally furnish but little information, and that of a negative description, in this disease, — will lead to the inference that it depends upon both those morbid states. The limits of our enquiry are now narrowed to the question of the priority of their existence, and the relation which the one holds to the other. As to these points it may be remarked, that the early occurrence of expectoration, as well as its abundance, forbid the inference that the production of

viscid mucus is the consequence of relaxation of the spasm; whilst they favour the idea that the spasm is occasioned by this secretion in the irritable and morbid air-tubes; the severity and duration of the paroxysms being occasioned by these double states of disease, — an abundant secretion of viscid mucus in, and a spastic constriction of, the air-passages.

42. But it may be further enquired, are not those morbid changes the effect merely of a certain condition of the air-passages still more intimately connected with the disease than they are? I do not deny the possibility of lesions antecedent to those now specified; but the difficulty of ascertaining their exact nature must be conceded. It would certainly be advantageous to obtain this information, inasmuch as on it would be based the means of cure which might be employed early in the disease. That it is not inflammation is proved by concomitant and symptomatic phenomena, by the course of the paroxysms and of the disease, by the terminations usually characterising it, and by observation of the *juvantia* and *ludentia* during its progress. It seems, however, extremely probable that the morbidly increased secretion and spasm are preceded by a congestive state of the mucous respiratory surface; this state disposing to the spasm, and being, as well as the spasm itself, at last relieved by the copious effusion of mucus; the mucus first effused tending, however, for a time, to increase the spastic constriction of the air-passages, and the consequent struggle of the respiratory muscles to overcome it (§36, 37.), and to procure a fresh supply of air in the lungs. This antecedent state of vascular turgescence of the mucous surface of the bronchi in asthma, is perhaps most marked in that form of this variety, in which little or no expectoration accompanies the cough, at least early in the attack, and which, from this circumstance, and the causes which induce it, has been called the *dry catarrhal asthma*.

43. If it be still further asked, to what cause are we to impute this congestive state of the respiratory surfaces? I can only answer, to a certain primary change of the vital energy of the organic nerves supplying the blood-vessels, and actuating the muscular fibres of the bronchi; and hence, as the morbid changes of the circulation, secretion, and calibre of the air-passages, are merely effects of one cause, — of a previous change of the vital manifestations of the nerves of the organ, — it becomes of the utmost importance to ascertain the nature of this primary change with as much accuracy as possible, in order that remedial agents may be directed with precision to its removal; but the prosecution of this very interesting topic falls under another division of my subject. In estimating, however, the nature of this, as well as the other varieties of asthma, the difficulties opposed to expiration by the spasm of the air-tubes and the accumulation of viscid mucus in them, have been too generally overlooked in our eagerness to ascribe all the morbid phenomena to impeded inspiration. But I believe that the disease, particularly this variety of it, is as much occasioned by the obstacle these states of the air-passages present to free expiration; the air, by the greater power of the inspiratory over the expiratory muscles, being drawn in sufficient abundance into the lungs,

from which it is imperfectly expelled. From this circumstance the lungs are often kept in a state of inordinate dilatation, and the respiratory muscles excited to convulsive actions, occasioning dilatation or rupture of the air-cells, and consequent emphysema of the lungs. In the more advanced stages of the disease, in old and debilitated subjects, this struggle to dilate the thorax still further, proceeding from the wants of the system for respiration, and to expel the air from the lungs through the obstacles placed in its way, generally terminates unfavourably to the latter part of the respiratory actions; consequently expectoration is impeded or suppressed, and life is terminated, with the air-tubes and cells, and even the substance of the lungs, loaded and infiltrated with mucus, air, and serum. It is in this state that active stimulants and emetics, by rousing the energies of the frame, and by exciting the expiratory efforts during the process of vomiting, prove so frequently beneficial.

44. This form of asthma may be partial, affecting one lung only, or one more than another; but it is more commonly general; and in some constitutions, particularly in aged persons, and when it has supervened to repeated attacks of catarrh, the quantity of viscid mucus expectorated is very great.

45. Its *anatomical characters* are, slight swelling, or thickening, and softening of, the mucous membrane, with a slight appearance of redness in parts, and with marked congestion, and purplish tint of portions of this surface in the more severe or protracted cases. Sometimes these lesions are accompanied with slight oedema of the membrane, and the development of miliary tubercles in the lungs.

46. As the majority of cases of this disease is characterised from the commencement by copious expectoration, it becomes a question how far it deserves to be considered as a variety of asthma; but taking all its phenomena into consideration, particularly the spasm of the air-passages, and convulsive action of the respiratory muscles, as well as the circumstance of it having been usually considered as a species of asthma, and the difficulty of arranging it otherwise, I was unwilling either to assign it a different place, or to make it a distinct disease, to which it scarcely can lay claim. M. LAENNEC has placed it amongst catarrhal inflammatory affections of the bronchi: but I conceive that it is seldom inflammatory either in its origin or progress; and that, although occasionally commencing in, and always aggravated by, catarrh, it is not necessarily a catarrhal disease. Besides, inflammations of the bronchi and catarrhs are not identical affections, although the latter frequently pass into the former.

47. But, besides these considerations, many of the phenomena essentially characteristic of asthma always attend it to a greater or less extent. Upon an attentive examination, however, of the chest of a person afflicted with this affection, by auscultation and percussion, these phenomena are found to vary, in different cases, or even in the same case, at different periods of the attack; yet they are essentially the same as those which mark the preceding varieties, although not so evident to the senses as in them, inasmuch as they are obscured by a more prominent symptom—the copious mucous secretion and expectoration. Sometimes it

is manifest that certain parts of the air-tubes are differently, or even oppositely, affected at different periods of the attack. When the viscid mucous secretion proceeds from, and is still present in, the smaller ramifications of the air-vessels, this condition, together with some degree of spastic constriction of their circular fibres, either in a part only, or more or less throughout the organ, occasions many of the symptoms which characterise the second or spasmodic variety of the disease. But in proportion as the secretion rises to the larger air-tubes, and leaves the smaller ramifications clear; or when the mucous secretion proceeds chiefly from the former parts, and excites, or is accompanied with, spasms of these canals, but not to the extent of preventing the passage of air into the parts of the lungs which they supply; these parts generally expand freely, owing to the vital activity of the organ, the wants of the system for the changes effected on the blood by respiration, and the active contraction of the inspiratory muscles during the convulsive efforts of the paroxysm. Hence the part of the lungs thus affected generally furnish the puerile respiration, and a clear sound on percussion, with a full and prompt performance of the inspiratory actions,—phenomena characteristic of the first or nervous form of asthma.

48. Distinguishing the foregoing account of the symptoms of the first form of asthma, it will appear obvious that the distinction of it from every other disease cannot be difficult, particularly if we carefully bring auscultation and percussion to our assistance. The sudden attack of the paroxysms, the short period of their duration, the violence of their symptoms, their returning after intervals of ease and of tolerable health, are sufficient to characterise the disease. It is only when asthma is complicated with, or has induced, other diseases—as chronic or acute bronchitis, pneumonia, tubercular phthisis, organic changes of the heart and large vessels, or effusions of fluid within the thorax—that difficulty can arise in determining the exact state of parts; and here we have it in our power to resort to auscultation and percussion, which, if this disease be simple and uncomplicated, will furnish us with no very unnatural sound, at least with none which will exist with any permanency in any particular part of the chest; and if it be complicated, the nature and the extent of the organic changes will be ascertained by these means, as pointed out under their respective heads.

49. *A. Spasmodic affections of the larynx* may be mistaken for asthma; but they may readily be distinguished from it by the sound occasioned by the passage of air through the narrowed passage, which is very different from the wheezing sound of the asthmatic respiration. Besides, in all the affections of the glottis, the patient readily points to it as the seat of his sufferings. The patient also betrays much more alarm of impending suffocation; whereas in asthma he is seldom apprehensive of the result, however severe the attack may be.

50. *B. Severe cases of acute bronchitis*, owing to the viscid and copious expectoration accumulated in the bronchi and trachea, and to the spasm excited in these parts and in the glottis during its expulsion, are often accompanied with fits of

difficult and spasmodic respiration, so severe as to approach nearly to the character of the asthmatic paroxysm. But the presence of inflammatory fever in bronchitis; and the copious, albuminous, thick, and glutinous expectoration; the absence of the distressing sense of stricture of the chest and dyspnoea which attend asthma; the gradual accession and increase of bronchitis; its continued character, and slow subsidence; and the varying appearance of the expectoration, with the different stages of the disease; will be sufficient to distinguish it from the humoral form of asthma, unless both affections are associated, or the one passes into the other, which sometimes occurs, as when bronchitis seizes the asthmatic subject.

51. *C. Angina pectoris* may also be mistaken for a severe fit of asthma. But the circumstances inducing an attack of both affections, and the periods of their accession, are different. Besides, the fit of angina pectoris is attended with a feeling of impending dissolution—a sensation which never accompanies the asthmatic paroxysm. The peculiar pains, also, under the sternum, and pain and numbness of the left shoulder, arm, &c. characterising the former, are not present in the latter affection. When asthma becomes associated with disease of the heart and large vessels, these sensations may accompany it, which will render the diagnosis more difficult. But on the accession of the asthma, about the evening or night; the comparative quietude in it during the day, and in the open air; the history of the case; and the antecedent or attendant disturbance of the general system; will still continue, and serve to point out the nature of the disease.

52. *D. Hydrothorax* is frequently attended with suffocating paroxysms of difficulty of breathing occurring during the night. But it may readily be distinguished from asthma by the scanty urine; by external oedema, particularly of the extremities; and the dead sound furnished by percussion, and the absence of the respiratory murmur. It must not, however, be forgotten, that hydrothorax is not infrequently consecutive of chronic asthma, particularly when the valves and cavities of the heart have become diseased in the course of the asthmatic attacks.—The affection denominated the *Acute Asthma of Infants*, by MILLER; *False Croup*, by GUERSENT; and the *Spasmodic Croup*, by WICHMANN, MICHAELIS, DOUBLE, &c., is nearly allied to spasmodic asthma; one of the chief differences being its occurrence in infants. Its diagnosis, &c. will be found in the article on *Croup—Spasmodic*. The practitioner should also be careful not to confound the disease with the difficulty of breathing which sometimes accompanies hysteria, hypochondriasis, and the passage of foreign bodies into the trachea.

53. **PROGNOSIS.**—There are few diseases which continue longer without shortening life; and which, therefore, admit of a more favourable prognosis in respect of a fatal result, or a more unfavourable opinion as regards a perfect recovery. It is chiefly from the consequences of a severe or protracted state of the disease that we are to apprehend any danger; and these are to be ascertained by auscultation and percussion, and our opinions formed accordingly. *a.* The circumstances which warrant a favourable prognosis as to recovery are, a recent attack, and its occurrence from a decided cause; the constitution of

the patient being but little impaired; the absence of deformity and malformation of the chest; a free and easy state of the respiration, and a tolerably healthy condition of the various functions, during the intervals between the attacks. If the occupation of the patient be not injurious to the lungs; or, if so, can be readily relinquished; if the attacks are not extremely severe, nor of very long duration; and more particularly, if auscultation and percussion, as well as the rational symptoms, indicate an uncomplicated state of the disease, we have still greater reason to give a favourable opinion as to its issue.

54. *b.* On the other hand, an unfavourable idea must be entertained, especially as respects the perfect recovery of the patient, and his immunity from future attacks, if the fits be very severe; if the cough difficult, suffocative, and attended with great expectoration mixed with blood and purulent mucus,—a state of the expectoration generally indicating rupture or dilatation of the small air-vessels, or the existence of tubercles in the lungs. If the occurrence of hæmorrhage from the lungs, of epistaxis, of hæmorrhoids, or of the menses in females, be not followed by a complete solution of the attack;—if the disorder be of long standing, and present remissions merely, or imperfect relief in the intervals, the attacks continuing for several days;—if the means of cure furnish but little or no relief;—if the patient be far advanced in life, and his constitution have suffered much either previously to, or from the malady; and if the body evince signs of cachexia;—if he has neglected his disease, or has been injudiciously treated; and if the symptoms characterising any of the organic changes which I have stated to proceed from, or to be associated with, asthma (§20—24.), present themselves, particularly dropsical effusions in the pleura or pericardium, and the nature and extent of these changes are determined by means of auscultation and percussion, an unfavourable result must be looked for sooner or later; yet may this result be often deferred for a long period by judicious management. The exact degree or proximity of danger will depend entirely upon the nature and extent of the existing organic lesions, and the state of the vital energies of the frame.

55. If the expectoration become purulent, round, and globular; if hectic fever be present, with irregular or intermittent pulse; if palpitations occur, and alternate with leipthymia or syncope; if the urine be in small quantity and high coloured, the hands and ancles being cedematous; if the countenance continue bloated or livid during the imperfect intervals between the attacks; if the patient become restless, with slight wandering or low delirium; a fatal termination is not very far distant, unless under the most favourable circumstances of regimen and medical treatment, when life may be occasionally protracted for some time.

56. **CAUSES.**—1st, *Predisposing causes.* Asthma is not a disease of early life, in its primary or idiopathic form. I have seldom or ever seen it before the 23d year of age. Some authors state that they have met with it in infancy and childhood; but I believe that they have confounded this affection with other diseases of the respiratory organs, and particularly with those to which young children are liable, and which has been termed spasmodic

croup, MILLAR's asthma, &c. by several modern writers, and its nature very generally misunderstood. The reader will find them treated under other articles. (See LARYNX—*Spasmodic*; CROUP—*Spasmodic*; and CATARRH—*Suffocative*.) I believe that affections of the respiratory apparatus in children, which are not connected with inflammation, are generally symptomatic of disease of some other organ.

57. Asthma is evidently sometimes dependent upon hereditary disposition and conformation. It invades all temperaments, but especially the melancholic, the sanguineo-melancholic, the nervous and irritable. The male sex is much more disposed to it than the female, particularly those of the former sex who are of a full habit of body and advanced in life. JOSEPH FRANK surely reckons the proportion of cases in males somewhat too high, when he states that six are affected to one female. So far, however, as my own experience enables me to judge, the proportion is not much less. Persons endowed naturally with great sensibility of the nervous system, or who have acquired this state from indulgence of the passions—from masturbation, venereal excesses, the immoderate use of warm bathing, long continued mental exertions, want of the requisite sleep, frequent excitement of temper, mental depression, and exhausting discharges, are much more disposed than others to be affected by the exciting causes of the disease.

58. The *spasmodic form* of asthma attacks most frequently persons of a spare habit, and who have been weakened or emaciated by the foregoing causes; or who have passed a laborious and anxious existence; whilst the *humoral variety* of the disease is commonly met with in those who are gross, phlegmatic, corpulent, robust, or full of blood, and who have been long exposed to the causes of chronic and general weakness, and have led an indolent, luxurious, or sensual life.

59. In addition to the foregoing causes, sanguineous plethora; malformation and injuries of the lungs, chest, or spine; peculiarities of formation of the air-passages, of the cavities of the heart, and large blood-vessels; constitutional irritability of the air-passages and lungs; narrowness of the glottis, and morbid sensibility and irritability of the nerves and muscles of the larynx; congestions, enlargements, habitual distensions, or organic changes, in the large viscera adjoining the diaphragm, as of the liver, stomach, spleen, and colon; previous disease of the lungs and air passages, particularly frequent attacks of catarrh, and neglected winter coughs; and adhesions of the pulmonary pleura to the costal or diaphragmatic pleura, may be ranked amongst the predisposing causes of the disease. It should not, however, be overlooked, that the foregoing do not only dispose the system, and particularly the lungs, to the operation of the exciting causes, but are also of themselves capable of producing the disease, when they act intensely, or when their operation is of long duration.

60. Neglected or confirmed *dyspepsia*; erratic or metastatic *gout*; suppressed eruptions, discharges, and habitual perspiration of the feet, are also predisposing and concurrent causes of the disease. In addition to these, I may add, the warmth and closeness of our apartments, luxurious habits, and previous diseases affecting the lungs in a

particular manner—as whooping-cough, measles, small-pox, and typhoid fevers—as having a marked influence in predisposing to asthma.

61. 2d. The *occasional or exciting causes* are, various mental emotions and affections; paroxysms of anger, vexation, disappointment, anxiety, and all the violent or depressing passions; great fatigue; prolonged watchings; strong exertions of the voice, reading long aloud, or long speaking; terror, or surprise; sudden refrigeration of the surface of the body; or exposure to, and the respiring of a cold or hot, or a too moist or too dry air—these states of the atmosphere acting differently in different persons and varieties of the disease. Thus, the *third and first varieties* are generally relieved by a dry and pure air, whilst the *second variety* is occasioned or aggravated by it; and a very moist and cold air, or a humid, close, and warm air, whilst it frequently relieves the latter, always augments the former; but it is not infrequently observed, that states of the atmosphere which cannot be referred to grades either of temperature or humidity act very differently on different persons labouring under the disease, although the form may be the same. It seems to me extremely probable that this is owing, in a great degree, to the electrical states of the atmosphere, and the electro-motive condition of the frame; as sometimes the disease is occasioned by close and oppressive states of the air, particularly when these are preceded by a thunder-storm,—thunder and lightning being less influential in its production than the electrical states of the atmosphere which attend these phenomena.

62. There are, perhaps, few causes which more frequently produce asthma, than those which act directly on the air-tubes through the medium of the respired air, as various kinds of dust and irritating particles floating in it (see article on AIRS, as *productive of disease*); common coal smoke, the vapour from lime or brick-kilns, metallic fumes of every description, mephitic gases, every kind of acrid vapour, the fumes from chemical manipulations; hydrogen, nitrogen, carbureted hydrogen, carbonic acid gas, and all other gaseous productions floating in the atmosphere; employments which lead those prosecuting them to breathe an air charged with minute particles of vegetable, animal, or mineral productions, as manufacturers of cotton and wool, furriers, grinders, needle-pointers, &c. Odours of every description occasionally excite the disease, particular odours acting differently in different persons; those occasioning it in some, alleviating it in others—as the aroma of various flowers and plants, the smell of tobacco, ipecacuanha, &c.

63. The disease may also be produced, or rather a paroxysm may be occasioned in those subject to the disease, by whatever deranges the healthy function of the digestive organs, and particularly if it occasion acid or acrid eructations, which irritate the epiglottis and glottis, or cardialgia, flatulent or inordinate distension of the stomach or colon, or impedes the free descent of the diaphragm (*Ast. Stomachicum*, BAGLIVI; *Ast. Flatulentum*, FLOYER, SCHRÖDER, BALDINGER), and by irritation and spasm of the glottis and trachea, (WILLIS, LIEKTAUD, DESGRANGES, &c.). It is also sometimes occasioned in the female by hy-

terical affections (*Ast. Hystericum*, HORSTIUS, BAOLIVI, SAUVAGES, &c.); by misplaced, suppressed, or metastatic gout (*Ast. Arthriticum*, MUSGRAVE, HOFFMANN, STOLL, &c.); by the syphilitic poison; (*Ast. Venereum*, JUNCKER); by the slow introduction of lead into the system (WILLIAMS; *Ast. Metallicum* of ETTMULLER and ILSEMANN); by great obesity (FLOYER); the suppression of accustomed discharges and evacuations, and from vascular plethora proceeding from this cause (*Ast. Plethoricum*, DOVER, CULLEN, SAUVAGES; *Ast. Sanguineum*, HOFFMANN); by the repulsion of eruptions, the retrocession of exanthematous diseases, and the drying up of issues and eruptive discharges (*Ast. Exanthematicum*, CULLEN, et VAR. Aëtr.). It may also proceed from a cachectic habit of body (*Ast. Cachecticum*, HOFFMANN, SAUVAGES, &c.); from excessive impregnation of the system with mercury (SCHENK, BONET); and from chronic catarrh and bronchitis (LAENNEC, BOISSEAU, &c.).

64. 3d, *Symptomatic Asthma*.—But little is required to be added under this head, further than to specify in a general way some of the organic lesions that sometimes excite phenomena, which either closely resemble, or are the same as, those which accompany the idiopathic disease. Amongst those, the disturbance of the pulmonary circulation, and the nervous system, and irritation, occasioned by organic lesions of the heart and large vessels; by aneurismal tumours; by tumours affecting the diaphragmatic and pulmonic nerves (BOISSEAU, ANDRAL, and PARRY); enlargement of the cavities of the heart, and obstacles to the circulation through the openings into the ventricles or arterial trunks; by ossific deposits in these situations, or in the coats of these vessels, or in the external surface of the heart, or pressing on the pulmonic plexus of nerves (FERRUS); by polypi in the cavities of the heart and large vessels (DIEMERBROCK, FLOYER, ROSTAN); by adhesions of the pleura, and organic changes of the parietes of the chest, diaphragm, or spine; by curvatures of the spinal column, and lateral contraction of the chest, &c.; by hernia of the diaphragm (HECKER, BONET); by tumours and effusions within the chest and pericardium; by organic changes in the vicinity of the larynx and trachea; by enlargement of the lymphatic glands within the chest and the glands of the bronchi; by tumours developed in the mediastinum (SCHAEFFER); by foreign substances which have escaped into the trachea and bronchi; by organic changes of the lungs themselves, especially miliary tubercles, or similar productions in advanced stages of growth and change; by cedema of the lungs, or sero-sanguineous infiltration of their substance; and frequently by emphysema of the organ, and pituitous collections in the bronchi, the emphysema being a very common consequence and complication of the severer forms of the disease (BAILLIE, LAENNEC, &c.). Besides being sometimes induced by one, or more, of the above lesions, it may also be symptomatic of congestions and organic lesions of the liver and spleen; but, although those, and various other organic lesions enumerated under DYSPNOEA, produce spasmodic and convulsive states of impeded respiration in some rare instances, yet they are more commonly productive of continued or remittent dyspnoea. Asthma is, moreover, some-

times symptomatic of lesions affecting the *medulla oblongata* and spinal chord, of *hypochondriasis*, and of diseases of the colon and rectum.

65. III. *COMPLICATIONS OF ASTHMA*.—From the foregoing statement, it will be readily admitted that asthma very frequently presents itself in practice in complicated forms. Indeed, when the disease occurs in consequence of any of the states of the system described in § 60—64., or of any of the previously existing diseases and organic lesions of which I have stated it occasionally to be consecutive and symptomatic, it should be viewed as complicated with such lesion, and our attention, directed to the whole of the morbid association, both pathologically and therapeutically. Our enquiries should likewise be extended even to the functions of distant organs, as it will occasionally have an intimate relation even with them, particularly to the functions of the digestive, assimilative, and generative organs. Amongst the most common complications of the disease, I may mention the various forms of *catarrh*, *dyspepsia*, *hypochondriasis*, *hysteria*, *emphysema*, and *cedema* of the lungs, *hemoptysis*, *chronic bronchitis*, and *enlargement of the cavities of the heart*, as especially requiring our attention during the treatment. (See the articles EMPHYSEMA, CEDEMA of the LUNGS, and BRONCHITIS.)

66. The paroxysm of the third variety of disease is often occasioned by a common catarrh; and owing to this circumstance, as well as the presence of many of the symptoms of this affection, it has often been denominated catarrhal asthma. It is sometimes also complicated with active congestion of the lungs, particularly of its mucous surface. Dr. PARRY conceived that this state of the respiratory organs constitutes the disease; and instances the case of a person, who died in about twenty minutes with all the symptoms of spasmodic asthma, and in whom the only lesion was complete suffusion, of a damask rose colour, amounting in parts almost to blackness of the mucous membrane of the trachea and bronchi. Dyspepsia not only accompanies asthma, but very generally precedes an attack. The complication with bronchitis and hemoptysis is chiefly observed in the third variety; whilst the association with hysteria and hypochondriasis is most commonly met with in the nervous and spasmodic forms of the disease.

67. *Organic diseases of the heart and large vessels* are very frequently complicated with asthma. The former seems to be most commonly a consequence of the latter; but, in some cases, an opposite order of causation obtains. In all such states of disease, either too little, or too much blood enters the lungs, and the healthy relation between respiration and the pulmonic circulation is changed: if either too much, or too little blood passes, it is imperfectly purified, and the wants of the system occasion a sense of anxiety and anhelation. But I believe that the phenomena of associated disease of the heart, and of the pulmonary functions, may be more correctly explained by referring them to the state of the nerves supplying the organs. These nerves are so intimately related, anatomically and physiologically, that disease originating in, or affecting, any one part of them, will frequently influence the functions of the whole, or of such of them as are most intimately connected with the originally

diseased part. When, therefore, we find a portion of the particular order of nerves, which supplies the respiratory and circulating organs, remarkably affected—whether such portion influence the state of the bronchi, or the circulation through the lungs, or the actions of the heart—can it be a matter of surprise that an analogous disorder should extend to parts so intimately related anatomically and functionally as are the air-passages, the pulmonary circulation, and the heart and large vessels?

68. Upon taking a review of the causes of this malady, we shall perceive that it may be occasioned, like several other chronic diseases of the respiratory organs,—1st, By whatever lowers the vital energies of the frame, particularly as they are manifested in the lungs, and increases the susceptibility of the organ to the impression of external agents, or to internal morbid associations (§ 57.);—2d, By mental or moral states deranging the nervous influence actuating the respiratory and circulating organs (§ 61.);—3d, By agents which disturb the equilibrium existing between the cutaneous and respiratory functions (§ 61.);—4th, By causes acting, during respiration, directly on the seat of disease, either by depressing the vital and nervous influence of the organ, or by irritating its mucous surface, and thereby exciting its fibrous structure to undue contraction (§ 62.);—5th, By causes acting during respiration, especially aerial vicissitudes and states which modify or impede the respiratory functions, and favour congestion of the pulmonary mucous surface, or of the substance of the lungs;—6th, By whatever impedes the action of the respiratory muscles, or embarrasses the motions of the parietes of the chest (§ 63.);—7th, By lesions of the circulating organs deranging the circulatory function of the lungs or heart (§ 64.);—8th, By the extension of irritation from adjoining viscera or parts (§ 64.);—9th, By the destruction of the equilibrium between absorption and excretion (§ 58.);—10th, By the transference of morbid action from other parts of the frame (§ 63.);—11th, By affections of the respiratory nerves and plexuses, either at their origins, or in any part of their distributions (§ 57. 64. 67.). Hence the propriety of dividing asthma not only into the *nervous*, *spasmodic*, and *humid* varieties, but also into two divisions, as respects its relations to its causes, and to other diseases; viz. into *idiopathic* and *symptomatic*.

69. **PROXIMATE CAUSE.**—The majority of writers on this disease, from WILLIS down to the times of HOFFMANN and CULLEN, have referred it to spasm of the bronchial tubes; and the same opinion has been espoused by many contemporary authors, particularly LAENNEC, WILLIAMS, &c. ROSTAN and several French pathologists consider the disease as altogether symptomatic of organic changes seated chiefly in the heart and large vessels: but, although this may be conceded to be the case occasionally, I conceive that they substitute the effect for the cause; lesions of these organs necessarily supervening in the manner already explained (§ 67.), after repeated attacks. The doctrine, moreover, has been completely overturned by the post mortem examination of cases of the disease by CORVISART, FERRUS, GEORGET, LAENNEC, ANDRAL, DELENS, and BRICHETEAU, in which no such

changes were found. BREE, PARRY, and BROUSSAIS ascribe asthma to inflammatory congestion and irritation of the mucous membrane lining the air-passages; and this doctrine is at present adopted by many British and continental pathologists. I do not mean to dispute the existence, to a certain extent, of irritative congestion of the respiratory mucous surface, particularly in the *third* variety into which I have divided the disease, but still I believe that it is a part only of the changes from the healthy state, which constitute this malady. M. GEORGET contends that it proceeds from irritation about the base of the brain, and particularly at the upper part of the medulla oblongata, and origin of the respiratory nerves, occasioning convulsive paroxysms of the inspiratory muscles. MM. ROCHE and SANSON (*Éléments de Pathologie*, &c. t. ii. p. 642.) ascribe it to irritation of the nerves supplying the respiratory surfaces, occasioning convulsive actions of the respiratory muscles; ZALLONY to suppressed influence of the pulmonary nerves, and imperfect change of the blood in the lungs; DUPUYTREN to an affection of the par vagum; and HORN, HENKE, and many others, entirely to spasm of the bronchi. That the disease, in a great measure, depends upon the morbid state of the nerves supplying the lungs and respiratory muscles, is evinced by the case which occurred to M. FERRUS, who found, on the dissection of a female who had been subject to spasmodic asthma, a considerable ossific deposit in the centre of the pulmonary plexus, and compression of its nerves. There can be no doubt that irritation of the nerves, or impediment or interrupted nervous influence, will produce spasm of those muscular parts which they supply, and interruption of those functions which are dependent on their healthy influence.

70. The proximate cause assigned to the disease by CULLEN, PARR, and other modern authors, differs but little from that contained in the writings of WILLIS, BAGLIVI, HOFFMANN, BOERHAAVE, SAUVAGES, and others of their predecessors, excepting that it is stated by them with greater precision. It seems to me so correct, in the majority of cases, as not to admit of dispute. Doubtless the researches of contemporary pathologists have tended to show that many cases closely resembling this disease, and which would have been imputed to the same pathological states as it by our predecessors, depend on other conditions of the respiratory organs, and those differing widely in their nature from each other; thus abridging the number of purely asthmatic cases, and consigning to different organic lesions many that present nearly similar functional derangements to those which are strictly asthmatic.

71. I therefore conclude, with many of my predecessors, some of them unmeritedly overlooked at the present day, that asthma depends on a preternatural or spasmodic constriction of the air-passages, accompanied in many cases, especially in the humoral or catarrhal variety, and particularly when it assumes what M. LAENNEC has called the dry catarrhal form, with turgescence of the vessels of the lungs, particularly those supplying their mucous surface, and an increased secretion of mucus: and I would add, that, in this form of the disease, the spasmodic constriction of the air-tubes, the turgescence of their mu-

cous lining, and the accumulation of mucus in them, present an obstacle, not only to inspiration, but also to expiration; the lungs being thereby often kept in a state of inordinate dilatation, and the respiratory muscles excited to convulsive efforts, occasioning, in some cases, dilatation of the air-cells, or their rupture, and consequent emphysema of the organ, with effusions into the air-tubes, and other consequences described in the article on *Organic Diseases of the Lungs*.

72. IV. TREATMENT.—The treatment of asthma is generally directed to the fulfilment of two intentions; viz. to shorten or alleviate the fit; and to prevent its return, and thus remove the disease. The means of cure may therefore be divided, 1st, Into those which are to be resorted to during the paroxysm, with the view of attaining the first intention; and, 2d, Such as may be employed during the interval, for the accomplishment of the second. I shall notice successively the measures which may be resorted to for the fulfilment of these ends, with as strict a reference to the forms and complications of the disease as my limits will permit.

73. 1st. *Treatment of the paroxysm*.—In treating the fit of asthma, the practitioner will take cognizance of certain particulars, which should materially influence the choice, the combination, and the extent of the means, which are to be put in operation. The duration of the paroxysm; the age, temperament, and habit of body of the patient; the period he has been subject to the disease, the frequency of the attacks, and the particular form they assume; the state of health in the interval; and the presence or absence of concomitant, functional, or organic lesions of the lungs, heart, and digestive organs, are all of the utmost importance to be known; and, without tolerably accurate ideas respecting them be entertained, the disease cannot be judiciously treated. As individual cases vary greatly as to each of these circumstances, it would be impossible to describe in connection all the measures which may be employed in a paroxysm of asthma, so as to be appropriate to each of its numerous states and complications. Such descriptions, although they would be sometimes perfectly suited to a case, would as often be inappropriate, or even altogether inapplicable. I shall, therefore, detail separately the means of cure which have been found most beneficial, and point out the states and circumstances of the disease to which each of them seems best suited, at the same time arranging them in such a manner as to fulfil intentions of cure, based on the pathology of the disease.

74. A. *To remove congestion or repletion, when present*.—There are various symptoms which frequently present themselves during the asthmatic paroxysm, which would suggest the propriety of blood-letting. But it is often either of little service or positively prejudicial, especially in the first two varieties of the disease. In the third variety, however; and in the young, robust, middle-aged, and plethoric subject; or when the paroxysms are very severe, and are attended with signs of much congestion of the lungs and brain, as lividity and fullness of the countenance, stupor, extreme dyspnoea, &c.; blood-letting is indispensable, and should be performed either from the feet, or by cupping between the shoulders.

Yet, even in these cases, bleeding will seldom do more than relieve the more urgent symptoms: it will seldom or ever put a stop to the paroxysm, and it should be practised always with much caution.

75. B. *To moderate or relieve spasm by antispasmodics, anodynes, and narcotics &c.*—These medicines may be viewed in connection, as a combination of them are more suited to the asthmatic fit, than the exhibition of them singly. They are beneficial chiefly in the first and second varieties of the disease, and in the third, when attended with severe convulsive and spasmodic fits of cough. When the disease occurs in hysterical females, or is associated with organic change of the heart or large vessels, these medicines are generally of much service. In the humoral form of the disease, and particularly when it commences, or is complicated with catarrh, they are less serviceable, though sometimes beneficial when judiciously employed. The particular remedies belonging to the above classes, which have received the approbation of the best authors, are *camphor*, *assafoetida*, *valerian*, *castor*, *musk*, *ammonia*, *ethers*, *coffee*, *opium*, *stramonium*, *tobacco*, *belladonna*, *hyoscyamus*, *conium*, *prussic acid*, *colchicum*, *digitalis*, *lactuca virosa*, &c. &c., in various forms, and modes of combination.

76. a. *Camphor* is one of the most generally beneficial of any of this class of remedies, and is, when judiciously exhibited, applicable to nearly all the forms and complications of the disease. In the nervous and spastic varieties it is most serviceable when given in large doses (from three to ten grains), and combined with musk, castor, assafoetida, and the preparations of ether, opium, or hyoscyamus (see F. 25. 186. 423. 493.), and the following:—

No. 34. R. *Camphoræ rasæ*, gr. iij.—vi.; *Ammon. Carbon. gr. iij.*; *Pulv. Ipecacuanhæ gr. i.*; *Extr. Hyoscyami gr. iij.—v.*; *Mucilag. Acacis q. s.* M. *Flant. Pilule iij.* statim sumende cum Haustu sequente, et horas post binas repetendæ, si sit opus.

No. 35. R. *Magnes. Subcarb. ʒj.*; *Aq. Anethi 5 x.*; *Spirit. Ether. Sulph. Comp. ʒj.*; *Tinct. Castorei ʒj.*; *Ol. Anisi ʒiij.* M. *Flat. Haustus.*

77. In the pituitous or catarrhal form of the disease, or in cases where blood-letting may be practised, and where we suspect active congestion of the mucous surface of the air-tubes, camphor is best exhibited in moderate doses, and combined with nitrate of potash, ipecacuanha, kermes mineral, James's powder, and other antimonials (see F. 494—496.).

No. 36. R. *Pulv. Jacobi Veri gr. iij.—vj.*; *Camphoræ rasæ gr. ij.—iv.*; *Pulv. Ipecacuanhæ gr. j.*; *Ext. Hyoscyami gr. iij.—vj.*; *Syrup. Papaveris q. s.* M. *Flant. Pilule iv.*, quorum capit binas statim, et alteras post horam, vel omnes horâ decubitis.

No. 37. R. *Camphoræ rasæ gr. j.—iij.*; *Antimonii Tartariz. gr. ss.*; *Potassæ Nitratis gr. v.—viij.*; *Moschi gr. ij.* *Extr. Opil gr. ij.—iv.* (vel *Ext. Lactucæ gr. iij.—v.*); *Ol. Anisi q. s.* ut *flant. Pilule iv.*, quorum capit binas statim, et alteras post horam, vel sumat omnes horâ somni.

78. b. *Assafoetida*, *castor*, *musk*, *valerian*, *myrrh*, *ammonia*, the *balsams*, the *oxide of bismuth*, the preparations of *zinc*, and the *ethers*, may be severally exhibited in the same states of the disease. They are more beneficial in the nervous and spasmodic varieties, when unassociated with inflammatory irritation, particularly in chronic cases, in the debilitated or aged; and in the third variety, occurring in persons of a relaxed and leucophlegmatic habit of body,—a conclusion which is conformable to the experience

of MILLAR, RENARD, SCHLEOEL, WOLFF, DOVER, REIDLIN, BANG, SCHMIDTMANN, WICHMANN, LENTIN, KRETSCHMAR, LOEBEL, HUFELAND, and BERNHARD, and which will be justified by future observation, notwithstanding the doubts of their efficacy which have been entertained by some writers, who consider asthma as merely a form of inflammation of the mucous surface of the air-passages. They may be conjoined with one another, or with narcotics; and may be advantageously administered, particularly assafoetida and valerian, in the form of elyster.

79. Although these antispasmodics are indicated chiefly in the forms of the disease above alluded to, they need not be restricted to them entirely. When combined judiciously, as either with *antimonials*, or with *colchicum*, *opium*, *digitalis*, *nitrate of potash*, *camphor*, *ipeacacuanha*, *hyosciamus*, *conium*, &c., and given in suitable doses, according to the peculiarities of the case, they will be productive of much benefit, in other states of asthma, both in the paroxysm and in the intervals. The external application of them, especially of camphor, assafoetida, galbanum, ammoniacum, &c., in the form of plaster, and particularly in conjunction with opium or with belladonna, will sometimes prove of much service. (See F. 112, 113.)

No. 38. R. Extr. Opil. Camphoræ, ʒi ʒij; Emplast. Galbani Comp. 3 lijsa.—3 ss. Fiat Emplastrum secundum artem, acuto pectori admovendum.

80. c. Besides the beneficial effects produced by it as an emetic, *ipeacacuanha* is, when used with this or other intentions, one of the best medicines that can be resorted to in asthma, as being suited to all the states of the disease, particularly when judiciously combined with other substances. It may be associated with nitre, or colchicum, or digitalis, or with antimony, camphor, and narcotics, in the more febrile and catarrhal states of the disease (see F. 39. 394.); and with assafoetida, or with castor, benzoin, the spirits or oil of aniseed, valerian, opium, &c. in the more nervous or spasmodic varieties. (See F. 857. 900.)

81. d. The distilled *laurel water*, or the *prussic acid*, particularly the latter, is often productive of much benefit in the paroxysm. I have found it of great advantage when given in from two to four drops at the accession of the paroxysm, and in small doses in the intervals, particularly when the disease is attended with much irritability of the stomach and flatulence. It may be conjoined with camphor, ipecacuanha, æther, &c., or, indeed, with any of the medicines already mentioned. (See F. 344.)

82. e. Of the narcotics, *opium*, *hyosciamus*, *conium*, *stramonium*, and *belladonna*, are the most commonly used. The best preparation of opium in this malady is the compound tincture (see F. 729.); and it is most advantageously combined with camphor, aniseed, any of the æthers, or the wine of antimony or of ipecacuanha, according to the circumstances of the case. I have tried the *acetate of morphine* in this disease, as a substitute for opium, but with no benefit, unless when combined with stimulating antispasmodics; in which form, either the *sulphate* or the *muriate of morphine* may occasionally be employed. *Hyosciamus* and *conium* are often uncertain remedies; but when their preparations are genuine, they are very useful adjuvants, par-

ticularly the former; and, if judiciously prescribed, applicable to every state of the disease. The combination of *hyosciamus* with the *infusion of valerian* has been much praised by LOEBEL in the spasmodic form of asthma.

83. f. *Belladonna* has been found serviceable when combined with stimulating antispasmodics, particularly camphor, valerian, or assafoetida; but it requires caution. In conjunction with ammonia, galbanum, or assafoetida, &c. in the form of plaster (§ 79.), it will sometimes be productive of much benefit. The *lactuca virosa* will be also employed with advantage, under similar circumstances to those in which the above narcotics are beneficial. SCHLESINGER and WOLFF advise two or three grains of its extract to be given, either alone, or with half a grain of digitalis, every two hours.

84. It may be observed generally, that narcotics can seldom be productive of any effect under a certain space of time, which will vary with the susceptibility of the patient. In many cases they will have no marked influence under two, or even three or four hours, at which time the severity of the fit will often subside without medicine. When given by the stomach, therefore, this circumstance should be kept in recollection, and should induce the practitioner to ascertain the chief accession or aggravation of the paroxysm, and regulate the periods at which these, as well as other remedies, are to be exhibited, in such a manner as that their anticipated action may be coincident with the commencement of the fit. As the attack consists generally of a series of paroxysms or exacerbations, medicines should be continued in suitable doses, and with reference to this circumstance, until it terminates. It will be found always advantageous to prescribe a full dose of the narcotic at once, in order that its effects may be secured as soon as possible. When any one or more of the stimulating antispasmodics, particularly camphor, ammonia, or musk, are combined with narcotics, a very large dose of the latter may be exhibited. Narcotics are most quick in their operation, when their vapour or smoke is inhaled into the lungs. Their effects are longest delayed when they are applied to the external surface; unless the cuticle has been previously removed, as in the “*entermic*” method of medication. The inhalation of the vapour of certain of this class of remedies, either alone or in conjunction with some volatile vapours, is one of the most certain and quick modes of obtaining relief in the asthmatic paroxysm.

85. g. *Stramonium* is one of the best remedies that can be prescribed in the spasmodic form of asthma. It is principally used by smoking it as tobacco. During this process, the patient may either draw a portion of the smoke into the lungs, or swallow some of it, or the saliva which has become impregnated with it. *Stramonium* is very advantageously smoked along with aniseed, or with a small portion of tobacco. It may also be employed internally during the asthmatic paroxysm, as follows:—

No. 39. R. Pulv. Fol. Stramonii gr. j.—liij; Sodæ Subcarbon. exsic. gr. vj; Olei Anisi q. s. ut fiat Pilule ij. statim sumende.

No. 40. R. Succ. Inspissat. Stramonii gr. ss.—gr. j; Potassæ Subcarb gr. viij; Olei Cajuputi q. s. Fiat Pilulæ ij. pro dose sumende.

86. The smoking of tobacco is one of the most generally employed and efficacious remedies we possess for this disease; but it is productive of marked benefit only when it excites a free expectoration. The tobacco may be used in this manner along with *aniseed*, or with *stramonium*, or both. The internal use of preparations of tobacco, as of its infusion, tincture, wine, &c., so as to excite nausea, has also been recommended in the paroxysms of asthma by ETTMULLER, MICHAELIS, and several German writers.

87. *h. Lobelia inflata*, or Indian tobacco, has been much employed in America in asthmatic cases. It is nearly allied in its operation to stramonium and tobacco; and often succeeds in checking the paroxysm, when given at its invasion, or very shortly before. It sometimes, however, fails of having any good effect, unless it be taken to the extent of producing nausea and vomiting. From six to fifteen or twenty grains of its powder may be prescribed for a dose, or from half a drachm to two drachms of a saturated tincture of its leaves (3j. to Oss.).

88. *i. Inhalation of emollient and medicated vapours, gases, &c.*—Next and, perhaps, equal to smoking is the inhalation of simply emollient, or of medicated vapours into the lungs. This method of treatment was recommended by CAVALIERE, AURELIANUS, ALBERTI, MUSELLI, PELLEGRINI, PULENIUS, ZALLONY, HUFELAND, WRIGHTON, FORBES, GANNAL, SCUDAMORE, and many others. It is chiefly indicated during the paroxysm, or shortly before its access. The vapours arising from pouring boiling water upon camphor, any one of the narcotic extracts or tinctures, or the balsams, are of great advantage when properly managed. Thus the vapour from a pint of boiling water poured upon half an ounce of balsam of tolu; or that from a solution of camphor, balsam of tolu, and extract of lettuce, or of conium, in sulphuric ether; or the fumes proceeding from camphor, hyosciamus, and aromatic vinegar, mixed together, and quickened by the addition of some boiling water, may be employed. A solution of balsam of tolu in sulphuric ether, the vapour of boiling tar diffused in the air of the patient's chamber, chlorine gas much diluted with common air, and various other medicated vapours, may be tried; but these act chiefly by removing the viscid phlegm which collects in the bronchi, and by exciting the extreme exhaling vessels. I have prescribed the vapour of the sulphuret of iodine in two cases: in one of spasmodic asthma, with no benefit; and in one of humoral asthma, with only temporary advantage. Sir C. SCUDAMORE recommends this formula for the inhalation of iodine—(R. Iodinæ gr. viij.; Potassæ Hydriodatis gr. v.; Alcoholis ʒss.; Aquæ Destil. ʒvss. M. Fiat Mistura). To this he adds tincture of conium. But his directions as to quantity and mode of inhalation are, notwithstanding several attempts to unravel them, perfectly beyond my powers. I believe, however, that portions only of the above mixture should be employed for each inhalation. But the observing practitioner will generally be able to apportion the quantity, as well as to direct the particular materials, for inhalation, according to the peculiarities of the case; bearing in recollection that the combination of narcotic and anodyne vapours with volatile fumes and gases will generally be of

more service in asthma than the use of individual substances belonging to one only of these classes of medicines; and that the more irritating substances of this description, such as iodine, chlorine, and tar vapour, should be ventured upon only in a very weak or dilute state.

89. *C. To remove viscid phlegm, and to prevent its formation.*—*a. By expectorants, &c.* Squills are amongst the most frequently prescribed medicines for this purpose, in asthmatic attacks; but they are certainly not applicable to all its states, although they, as well as ammoniacum, inula Helenium, and senega, are very generally recommended by some of the best medical writers. The good effects of these medicines in certain manifestations of asthma cannot be doubted; but I have seen them productive of much mischief in several cases in which they had been employed. It should be kept in recollection, that they are amongst the most active excitants of the respiratory mucous surfaces we possess, and are extremely apt to change active congestion of the bronchial lining into inflammatory action, especially in young, plethoric, or robust subjects; and, by their effect upon the expectoration—particularly by increasing it, rendering it thinner, less viscid, and more readily expectorated—to occasion a deceptive appearance of benefit, even when they are increasing morbid action, with all its ill effects. In relaxed and leucophlegmatic habits, however, or when the expectoration is viscid, and excreted with difficulty; the skin cool, soft, and moist; the pulse soft, slow, or weak, and the urine scanty; these medicines may be given with great benefit (see F. 66, 67, 74, 350.): but when the pulse is either hard, quick, or full; or the expectoration at all puriform; they cannot be exhibited without risk. They will often, doubtless, even in cases of active congestion of the respiratory mucous surfaces, afford real benefit, by exciting the capillaries to secretion, and thereby unloading them; but they may as readily kindle up inflammatory action. When combined, however, with antimoniales, refrigerants, diuretics, or anodynes, the risk of mischief from them in doubtful cases is much reduced. ALBERTI, FLOYER, WAGNER, SCHULZE, LENTIN, and BREE advise squills in the pituitous form of the disease, and found them most serviceable when they produced nausea or vomiting,—the benefit being, perhaps, more to be attributed to this operation, than to the medicine which occasioned it. Under the circumstances in which I have admitted the use of ammoniacum, squills, inula Helenium, benzoin, and senega,—namely, in the chronic pituitous asthma,—the Formulæ in the Appendix above referred to, or the subjoined, may be prescribed:—

No. 41. R. Scillæ exsic. gr. xij.; Myrrha ʒij.; Extr. Hyosciami ʒss.; Olei Anisi q. s. M. Fiat Pilulæ xvij., e quibus sumantur binæ quartis vel sextis horis.

No. 42. R. Scillæ Pulv. gr. vj.; Pulv. Ipecacuanhæ gr. vj.; Camphoræ rasæ gr. xv.—ʒj.; Pulv. Antimonialis gr. xij.; Extr. Hyosciami ʒss.; Syrup. Tolutan. q. s. Fiat massa equalis, et divide in Pilulas xvij., quarum capiat binas tertis vel quartis horis ex cyatho decocti Aithmæ.

No. 43. R. Tinct. Scillæ ʒij.—ʒj.; Acidi Nitrici dil. ʒviii.—ʒxxiv.; Aquæ Pulegii ʒss.; Spirit. Æther. Nit. ʒss.—; Spirit. Pulegii ʒj.; Extr. Hyosciami (vel Conii) gr. iij.; Syrup. Tolutan. ʒj. M. Fiat Haustus tertis vel quartis horis capiendus.

No. 44. R. Mist. Ammoniac ʒivss.; Liq. Antimonii Tart. ʒiv.; Tinct. Camphoræ Comp. ʒss.; Syrup. Tolutan. ʒj. M. Capiat cochleare unum pro re nata.

No. 45. R. Mist. Ammoniaci, Aquæ Destil. Lauro-Cerasi, æâ 3jss.; Tinct. Castorei 3ij.; Tinct. Opil Co. (F. 729.) 3ss.; Syr. Tolutan. 3j. Fiat Mist., cujus sumat cochleare unum amplum subide.

No. 46. R. Balsam. Tolutan. 3jss.—ij.; Mucilag. Aca-cis 3j.; tere benè et adde, miscendo, Tinct. Benzoini Comp., Tinct. Opil Camphoratæ Prit. æâ 3ij.; Olei Anisi 7ij. x.; Aquæ Pulegii et Aq. Anethi æâ 3ij.; Syrup. Simp. 3j. M., Capiat coch. ampla duo quater in die.

90. *b. Emetics* are amongst the most powerful beneficial remedies that can be resorted to during the paroxysm, with the intention of removing both phlegm and spasm; and they have been justly recognised as such by CÆLIUS AURELIANUS, HORSTIUS, MAYERN, FLOYER, AKENSIDE, BANG, KERES, HUFELAND, WEDEL, STOLL, BRFF, LOEFFLER, and SCHMIDTMANN. *Ipecacuan* is, upon the whole, the best medicine that can be employed to produce this effect. The philosophical AKENSIDE recommended a scruple of it to be given at the commencement of the paroxysm, and five grains every morning during the intervals, for some time, so as to occasion nausea. When the paroxysm is excited by an overloaded or deranged state of the stomach, emetics are particularly indicated. It is in such cases that SCHMIDTMANN, one of the most practical and experienced of modern writers, recommends them; while STOLL and LOEFFLER advise them principally in the humoral form of the disease. In the asthma in which several classes of artisans, particularly pearl-turners, &c. (see ARTS, and the Causes of Disease,) are liable, emetics have been found the most successful remedy in the paroxysm. But, besides this operation, *ipecacuanha* has an especially beneficial effect in asthma, as I have already particularly noticed. Next to it, and even superior to it in the very humid states of the disease, are the preparations of zinc, particularly the sulphate, in suitable doses and forms of combination (see F. 582—587.).

91. *c. Nearly allied to emetics are nauseants and diaphoretics.* These are sometimes of service, either at the commencement, or shortly before the fit. The substances that may be employed to produce this effect are *ipecacuanha*, and the different preparations of antimony, particularly the tartar emetic and kermes. These latter are praised by BANG, VICAT, and HUFELAND. *Ipecacuanha*, in from one to five grains, or the antimonials in full doses, may be combined with nitre, camphor, opium, or hyoscyamus, according to the circumstances of the case (see F. 393. 854.).

92. *d. Refrigerants.* Of this class of medicines the most useful is the *nitrate of potash*, in conjunction with camphor, *ipecacuanha*, and hyoscyamus (F. 279. 431. 436.), particularly in the humoral variety of the disease; in the state described as requiring blood-letting; or when the attack has been induced by, or is complicated with, catarrh. Either of the following draughts may be taken at the commencement of the paroxysm, and repeated in two hours, if necessary:—

No. 47. R. Potassæ Nitratis gr. x.—xk.; Spirit. Æther. Nit. 3j.; Vinî Ipecacuanhæ 3j.; Tinct. Hyosciami 3j.; Mist. Camphoræ 3j.; Syrup. Tolutan. 3j. M. Fiat Haustus statim sumendus.

No. 48. R. Potassæ Nitratis gr. x.—xvj.; Vinî Ipecacuanhæ, Tinct. Hyosciami, æâ 3j.; Liquor. Ammon. Acet. 3ij.; Mist. Camphoræ 3j.; Syr. Tolutan. 3j. M. Fiat Haustus statim capendus.

93. Besides the internal use of refrigerants, LOEFFLER recommends cold epithems to be placed

on the chest, in the spasmodic form of the disease; and several Continental writers advise clysters of cold water to be administered when asthma seems to be connected with hysteria. In such cases, clysters of assafoetida or of infusion of valerian are preferable. Refrigerants act both by diminishing inordinate secretion, and by allaying spasm; and, when the disease is connected with active congestion, or excitement, are, with depletion, the safest measures that can be employed to remove, or to prevent the formation of phlegm.

94. *D. To transfer irritation to other parts*, or to recall the disease to its original seat, when it has arisen from the metastasis of gout, rheumatism, or the suppression of discharges, is often an important indication. The usual means of *revulsion* and *derivation*, or counter-irritation, particularly those which produce this effect with the greatest celerity, as *sinapisms*, *stimulating pediluvia*, and the *vapour bath*, are the chief revulsants that are admissible under such circumstances and at this period. They may be accompanied with diaphoretics, aperients, diuretics, or even emmenagogues, in particular cases. They have also occasionally been found successful in preventing the accession of the fit; particularly if employed when the premonitory signs first appear; and if internal derivatives, especially a purgative combination of antispasmodics and carminatives, have preceded them, they have been followed by gentle diaphoresis.

95. *E. To remove flatulences, by means of gentle aperients combined with carminatives*, is often necessary during the course of the paroxysm. I have observed much benefit derived from the exhibition of a purgative, combined with antispasmodics and carminatives, shortly before the expected accession of the attack, particularly when the premonitory signs begin to appear, and the digestive organs evince disorder—such disorder often acting as the efficient cause of the seizure. (See F. 28. 181. 266. 379.) The combination of diuretics, also, with the medicines prescribed during the paroxysms, or of carminatives, in order to relieve the distressing flatulence with which they are very generally accompanied or preceded, will be often found of service.

96. *F. Besides the means noticed above, there are several which have been recommended in the fit—some of them most deservedly, others in a very indiscriminating, and hence not a very beneficial manner. Of the former of these, warm coffee is the most important. This dietetic remedy was used by FLOYER in this disease, and more recently by THILENIUS, PERCIVAL, and BREZ. It generally affords much relief when made sufficiently strong; and it seems to resemble the stimulating antispasmodics, particularly camphor, in its action. I have also observed the paroxysm checked by strong green tea.*

97. My limits oblige me merely to enumerate the other medicines which may be resorted to in the paroxysms of asthma. The chief of these are, dry cupping between the shoulders, a weak solution of phosphorus in ether, the oxides of *bismuth* and *zinc*, *nux vomica*, &c. by several Continental writers; *galvanism*, as recommended by Dr. W. PHILIP; electricity, by M. SIGAUD LAFOND; the *chenopodium amrosioides*, by HUFELAND; the infusion or spirits of juniper, by BEKKER; guaiacum, by AASKOW, particularly when the

attack occurs in the gouty or rheumatic diathesis; cajuput oil, in the spasmodic form of the disease, by WICKMANN; the veratrum album, by MÜLLER; the muriate of ammonia, by MARTIUS; and the external application of garlic, by PORTAL.

98. 2d. *Treatment during the interval.* — Our chief object during the interval is to prevent the accession of the attack, by avoiding the remote causes, and removing the morbid state of the digestive and respiratory organs which dispose to it, and whatever disorder of function or of structure with which the disease may have become associated. We should, therefore, endeavour to form a correct opinion respecting the state of the bronchial mucous surface, the morbid associations of the affection, and the consecutive lesions which may have already supervened to it. The state of the digestive functions, of the alvine secretions and excretions, should receive the utmost attention; and the means which may be most appropriately used for their promotion, in particular cases, ought to be assiduously employed.

99. A. *Evacuations, &c.* — Under this head I will briefly consider blood-letting, emetics, purgatives, blisters, issues, and diaphoretics. a. *Bleeding* is seldom of service in the uncomplicated state of the disease. But when it is accompanied with vascular plethora, or pulmonary congestion, or when the attack seems to have been excited by the suppression of an accustomed discharge, whether sanguineous or of other description; a moderate blood-letting, or cupping between the shoulders will be of advantage.

100. *Diaphoretics* during the intervals are only required when the disease is characterised by congestion of the mucous surface of the lungs, obstruction of the bronchi by a viscous secretion, or torpid and loaded state of the liver and biliary apparatus. When prescribed shortly before the expected fit, they often succeed in preventing its accession.

101. c. *Purgatives* are often necessary; but they may also be detrimental. Those substances which irritate the digestive mucous surface, without producing a full feculent evacuation, are always prejudicial. Purgatives also are hurtful when they are employed so frequently as to lower the vital energies, and carry off a portion of the chyle which should be absorbed into the circulation. On the other hand, stomachic aperients and purgatives exhibited in combination with tonics and antispasmodics, and to the extent merely of promoting the digestive, assimilating, secreting, and excreting functions, are particularly beneficial. Either of Formulæ 266. 450. to 456. 462., contained in the Appendix, or the following, may be prescribed: —

No. 49. R Aloës Socot. gr. iv; ter benè cum Gum. Mastich. gr. ij; et adde Extr. Gentianæ Comp. et Mass. Pilul. Galban. Comp. æa gr. ij; Olei Anisi q. s. Fiat Pilule ij. hora somni quotidie sumendæ.

102. d. *Diaphoretics* in small doses, in conjunction with anodynes, deobstruents, or antispasmodics, are of service merely in as far as they may preserve a regular state of an important function, and prevent the determinations to internal organs which frequently follow any interruption to it. But profuse perspirations and warm bathing are more generally prejudicial than otherwise. Indeed, whatever relaxes the cutaneous surfaces beyond a certain degree has an injurious effect upon affections of the lungs which are not acutely inflammatory, and particularly

in the pituitous chronic asthma. When the paroxysm is associated with the dry catarrh, diaphoretics may be carried further with advantage; and when combined with expectorants and antispasmodics (§ 91.), they are more generally applicable.

103. B. *Expectorants, alterants, attenuants, and deobstruents*, or substances supposed to have some one or more of these effects, have been very generally recommended in asthma. Several of these have little or no effect, and others may even be injurious. a. The *expectorants* most frequently employed are those already noticed; but I believe that they are seldom productive of much advantage, given in the interval. When the disease is complicated, as it not infrequently is, with dry catarrh, or irritation of the bronchial mucous surface, those substances which have the effect of soothing irritation, relaxing spasm, and softening the pulse, as James's powder, ipecacuanha, camphor, antimonial wine, are in fact the best expectorants; inasmuch as they tend more to render the bronchial secretion less tenacious, where it is glutinous and obstructing the bronchi, and to diminish its quantity when too copious than those which are of a heating or stimulating kind.

104. b. Amongst those medicines which are considered as attenuants, deobstruents, and alterants, there are none which possess greater claims to consideration in this disease than the pure *alkalies* and their carbonates, or their combination with oils, and antispasmodic or narcotic substances. However the propriety of applying the above terms to certain medicines in this disease may be cavilled at, there cannot be the smallest doubt, in the minds of those who closely observe the operation of remedies, that certain substances produce effects, on the respiratory surfaces and on their secretions, that justify the use of these terms. The *alkalies* in various forms of combination, but particularly with oils, have been much praised by WOLFF, BACHE, SARCONÉ, MASCAGNI, and LAENNEC. Either in the pure state or in that of sub-carbonates, combined with the oils of *aniseed* or of *almonds*, with ipecacuanha, small doses of blue pill, and hyosciamus, the *fixed alkalies* are amongst the best remedies to which we can have recourse, particularly in the catarrhal or bronchial complications, and when the disease is connected, as it very often is, with irritability or other disorder of the digestive organs. I have experienced the greatest service, in practice, from the following, and from Formulæ No. 348. 457.

No. 50. R Sodæ Sub-carbon. exsic. ʒ ij; Pulv. Ipecacuanhæ gr. vj; Pilul. Hydrarg. gr. vj; Olei Anisi ℥ xij. vel q. a. ut fiat Pilule xvij, quarum sumatur binæ bis terve quotidie.

No. 51. R Potassæ Sub-carbon. ʒ ij; Pilul. Hydrarg. gr. iv; Extr. Hyosciami (vel Extr. Papaveris Albi) ʒ j; Olei Amygd. Dulc. q. a. ut fiat Pilule xvij, quarum capiat binas ter quotidie.

105. Under this head, I may make further mention of the balsams, combined with small doses of rhubarb, or with the addition of magnesia; of a combination of assafœtida, or myrrh, with galbanum, ipecacuanha, and soap, or the fixed alkalies (F. 503—510.); frictions with stimulating or antispasmodic liniments in the course of the spine (see the LINIMENTS in the Appendix); the nitro-muriatic acid wash; in a tepid state; over the chest, night and morning, or either the one or the other only; warm clothing, &c.

106. *C. Blisters, issues, and artificial eruptions* are often extremely beneficial, particularly when asthma has supervened to suppressed discharges, to exanthematous diseases, or in the gouty and rheumatic diathesis. A large blister, applied between the shoulders or on the chest, a smaller one kept open, and issues and setons, have been recommended by the majority of writers. ZACUTUS LUSITANUS and SEVERINUS advise the actual or potential cautery to the nape of the neck. The production of artificial eruptions over the chest by the tartar emetic ointment appears to me, from considerable experience of its effects for many years (see *Lond. Med. Repository*, vol. xvii. p. 302.), preferable to any other mode of counter-irritation in asthma, particularly when the use of the ointment is commenced during the interval.

107. *D. Tonics and astringents.*—*a.* The use of the preparations of bark during the intervals has the support of the best writers on the disease. Amongst these I may notice FLOYER, BANG, CHAPMAN, HEBERDEN, FELDMANN, RANOE, FRANK, WITHERS, RYAN, BREF, and LAENNEC. The states of the disease in which they recommend it, are, 1st, When the disease assumes a periodic type, or when it is connected with malaria; 2d, In the pituitous form of the disease, when the habit is relaxed and leucophlegmatic; and, 3d, When the stomach is much debilitated. There can be no doubt of the preparations of bark or the sulphate of quinine being indicated in such cases. Indeed, wherever the powers of the constitution require to be rallied, and where there exists no inflammatory irritation to contra-indicate it, bark and other tonics are frequently beneficial. In these cases, the decoction or the infusion may be given, with the liquor ammoniæ acetatis, and vini ipecacuanhæ, or with the subcarbonates of the alkalis.

108. *b.* I have derived great service from the sulphate and oxide of zinc in the humoral form of asthma, particularly under the circumstances now described. Either of these preparations may be combined with ipecacuanha, camphor, myrrh, hyoscyamus, conium, opium, &c., according to the peculiarities of the case. Where it is desirable to produce a nauseating or emetic operation during the fit, or in anticipation of it, the sulphate of zinc is the next best medicine to ipecacuanha that can be employed.

109. *c.* The preparations of iron have met with the approbation of BREE and STANGER, particularly the sulphate. It may be employed in similar cases to those for which bark and the sulphate of zinc are prescribed. I can only allude to the recommendation of the mineral acids with opium, by FLOYER, &c.; of the sulphate of barytes, by KECK and HUFELAND; of arsenical fumes, by the Arabian physicians, and EITTMULLER; of Fowler's solution, by ALEXANDER; of the nitrate of silver, by ZALLONY; and of a solution of phosphorus in ether, by several German writers. These very active medicines are admissible only in the most obstinate cases, particularly when occurring in relaxed or debilitated habits, and when other active tonics and antispasmodics are indicated. Saint Ignatius's bean, and the extract of nuxvomica, have also been mentioned by STEIN and HAHNE-MANN. Strychnine, the active constituent of these substances, seems deserving of a fair trial in catarrhatic cases.

110. *d. Sulphur, and its preparations*, have been advised by DIEMERBROECK, GASSER, MARTINS, and BANG; and from a few opportunities which have presented themselves of trying them, I consider them, particularly the balsamum sulphuris, — a combination of sulphur with the oils of aniseed, &c. (see F. 21. and 22.), — and the sulphurets of potash and soda, as medicines of no mean efficacy in several states of the disease. The sulphur precipitatum or sublimatum, taken in the form of an electuary (see F. 82. and 89.), is one of the best aperients to which we can resort in cases of asthma or continued dyspnoea. It may be also taken as follows:—

No. 52. R Sulphur. Præcip. 3 ss.; Semin. Anisi contus. 3 lss.; Confect. Sennæ et Syr. Tolut. aa 3 vj. M. Capiat coch. ij. minima pro dose.

111. There are various medicines which have been recommended in the paroxysm, which may also be occasionally employed in the interval, particularly shortly before the expected accession of attack, and upon the first intimation of its approach. Of these, the most important are the antispasmodics and narcotics already mentioned (§ 75.), with the smoking of tobacco, stramonium, and aniseed, and the inhalation of the vapours of narcotic substances and certain gases (§ 85. 88.).

112. *Flatulence* is a very frequent attendant upon catarrhatic cases, chiefly before the invasion of, and during, an attack. It seems connected with irritation of the sensitive mucous surface, and deficient vital power. The relief of this symptom is often a matter of importance. For this purpose I have sometimes prescribed the following:—

No. 53. R Olei Anisi viij.—xij.; Sodæ Sub-carbon. gr. xv.; Sacchari Albi Magnesiæ Ustæ, aa 3 l.; tere et adde Tinct. Castorei 3 l.; Tinct. Sennæ 3 l.; Aquæ Ment. Virid. Mist. Camphoræ aa 3 v.; Syrup. Tolutan. 3 ss. M. Fiat Haustus, 3tis vel 4tis horis ad tertiam aut quartam vicem sumendus.

113. *3d. Of the treatment of the various symptomatic and complicated states of the disease.*—But little is required from me on this subject, after the detailed account of the treatment now given. When the disease is associated with either of the usual forms of catarrh, diaphoretics, consisting chiefly of ipecacuanha, antimonials, &c., combined with narcotics or anodynes, are chiefly indicated; and, if inflammatory irritation seems to exist in the bronchial lining, local depletions, colchicum, or digitalis, counter-irritants and revulsants, gentle aperients, and the inhalation of the vapour of warm water, in which a little camphor has been thrown, may be added to the above.

114. In the frequent complications of inflammatory irritation of the digestive mucous surface, and disorder of the biliary apparatus, or of derangement of the functions of the heart, it will generally be advisable to commence the treatment with five grains of blue pill on alternate nights, for three or four times, and with an aperient draught on the following morning. By these the secretions will be excited, and the bowels evacuated. Afterwards the healthy state of action of the capillaries of the mucous surfaces generally will be promoted by exhibiting half a grain of blue pill, three or four times in the twenty-four hours, combined with two or three grains of the extract of hyoscyamus, or of extract of hop; vegetable tonics, with the fixed alkalis, or

other stomachic medicines, being taken through the day. If we have reason to suspect the existence of organic change within the chest, particularly inflammatory congestion in the lungs, enlargement of the structure of the heart, &c., the insertion of issues, or keeping up an abundant eruption on the external surface of the chest by the tartar emetic ointment, should be added to the above means. This treatment ought, with occasional variation according to the circumstances of the case, to be perseveringly continued for weeks, or even months; and it will often succeed, even in the most unfavourable complications. The oxide of bismuth, combined with tonic or bitter extracts, will also be found of service in the gastric associations of the disease.

115. When the disease is associated with affection of the head, or curvature of the spinal column, setons, issues, or moxas in the nape of the neck, or in the course of the spine, may be tried. If it be attended with disease of the liver, external irritation, the nitro-muriatic acid bath or lotion, small doses of mercury, and the plaster, Form. 117., may be prescribed. Organic lesions of the heart and large vessels, and dropsical effusions, require a combination of these measures with the use of alkalies, digitalis, opiates, &c. When hysteria, and generally increased sensibility and susceptibility, attend the asthmatic affection, tonics with antispasmodics are principally indicated. In the other complications of asthma, the treatment recommended in DYSPNŒA will be generally appropriate.

116. *Plan of the hygienic treatment.*—Much advantage will be derived in asthma from strict attention to diet and regimen,—comprising bathing, exercise, air, and climate, the use of mineral waters, &c. *A. Cold sponging the surface of the chest, and cold bathing,* are amongst the most approved means that can be resorted to during the intervals of asthma. They tend both to diminish the sensibility and susceptibility of the patient to the impression of cold,—one of the most frequent exciting causes of the attack; and to give a salutary tone to the respiratory mucous surfaces and vessels ramified in them; and hence they prove the best means which can be resorted to for the prevention not only of the asthmatic attacks, but of catarrhs, and all other affections and diseases of the respiratory organs. The patient should commence this practice with the following lotion, with which the whole of the chest and upper part of the abdomen should be sponged, or rubbed with a towel or piece of flannel wetted with it, and afterwards be dried, using smart friction at the time:—

No. 54. R. Acidi Acetici Pyrolignei vel Vini Albi, Liq. Ammoniac Acetatis, \mathfrak{ss} 3 iiss.; Ag. Rosarum 3 v.; Spirit. Vini Tenuioris 3 ij. M. Fiat Lottio.

This should be used every morning upon getting out of bed; and if the patient commence with it during the winter, a fire may be kept in the dressing-room, and the chill taken off it for the first few days of using it. Instead of the above lotion, a solution of common salt in water, in the proportion of two table spoonsful to a pint, or one part of vinegar to two of water, may be employed. After these have been continued for some time, or as long as the patient may please, and the system has been thus prepared for it, the shower bath may be substituted with advantage,

particularly if the patient be in that state of health which will allow him to bear the shock without risk. Sea or salt water bathing may also be resorted to all the summer and autumn; and the shower bath, or at least cold sponging the surface of the trunk of the body, all the winter and spring; for it will generally be advisable not to discontinue this practice for any considerable time after it has been fully adopted and found of service. In addition to the cold bath, the patient should have recourse to regular exercise in the open air; and attend to the state of his digestive organs, and the regular functions of the bowels.

117. If along with the asthmatic affection the patient have complained of palpitations, irregularity of the action of the heart, œdema of the ancles, severe dyspeptic symptoms, and disorder of the liver or bowels, these ought to be removed, before commencing with cold sponging and bathing, by local depletions when they are attended; by very small doses of blue pill, or the hydrargyrum cum creta, with the sub-carbonates of the fixed alkalies, and hyoscinus given at bed-time, a gentle aperient draught the following morning, and bitter tonics, with the alkalies through the day. The recommendation of cold bathing in asthma may startle some; but when all associated disorder of an inflammatory kind has been removed by appropriate treatment, and the means now specified, and when the system has been duly prepared for it, cold bathing is actually one of the most salutary measures, and the most permanently beneficial, that can be prescribed. It has, moreover, received the sanction of CÆLIUS AURELIANUS, FLOYER, WITHERS, MILLAR, RYAN, BREX, and HUFELAND,—names which should claim our respect for whatever they recommend, even if our own experience did not altogether confirm their opinions, which, however, is in accordance with theirs as to this practice.

118. *B. Mineral waters.*—The waters in this country, which are best suited to asthma, are those of Cheltenham and Leamington; and of Buxton and Bath, to some of its complications, particularly the arthritic. Dr. J. CLARK very justly remarks (*The Influence of Climate*, &c. 2d ed. Lond. 1830, p. 371. *et seq.*), that when asthma is accompanied with chronic irritation of the bronchial membrane, or with disorder of the digestive organs, and an unhealthy state of the skin, a course of warm mineral waters will often prove of benefit. The springs of Ems on the Rhine, of Carlsbad, of Bonnes and Cauterets in the Pyrenees, and of Mont d'Or in Auvergne, are those chiefly esteemed on the Continent. The great difficulty generally is, that the climate and degree of elevation of these places will often not suit particular asthmatic cases. Where the climate of a valley is likely to suit the patient, Ems and Carlsbad will be preferred; and where an elevated situation is required, the Pyrenees and Mont d'Or will be chosen. The artificial waters of Ems and Carlsbad, prepared at Brighton, are but little inferior to the natural springs. In a case of this disease, where I directed those of Ems, great benefit was obtained from them.

119. *C. Change of air and climate.*—It is impossible to point out the particular climate or locality which will best suit the asthmatic patient; for the state of air or climate which will suit one,

will distress another, and without any very evident cause to explain the different effect. In nearly all cases, however, changes of air are beneficial, chiefly as respects the general health of the patient, and the disorders with which asthma is associated. Upon the whole, a temperate, equable, and moderately moist state of the air is best borne: but even in this, there is much uncertainty. The physician must be guided in his choice by the kind of asthma with which the patient is afflicted, and by the ascertained effects of certain seasons and localities in his particular case. In general, a moist and warm, or mild climate, as the south-west extremity of this island, will suit the spasmodic or dry form of the disease, and that most commonly associated with the dry catarrh, much better than any other in this country; whilst the pituitous or humid variety, occurring in the debilitated or aged, and in those of a relaxed and leucopneumatic habit, and attended with much expectoration, will require a dry and a somewhat bracing state of the air.

120. *D. Diet.*—Very little is required to be stated on this topic. The food should be always light, digestible, in small quantity, and chiefly farinaceous; particularly in those cases which indicate general or local plethora, inflammatory irritation, and disorder of the digestive organs. Floyer particularly insisted upon abstinence, as to both eating and drinking; and later writers, and experience, have confirmed the justice of his injunction. When the disease is accompanied with lowered energies of the powers of life generally, the diet should not be so poor as to furnish insufficient means whence the mischief may be repaired; but it ought, notwithstanding, to be light or digestible, and not exceeding the powers of the digestive organs to manage with facility.

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ATROPHY.—(From the privative *a*, and τροφή, nutrition, or τροφός, I nourish.) PATHOLOGY.—Morbid Structure.—Syn. Atrophie, Consomption, Fr. Ungedeihen, Schwindsucht, Verzehrung, Ger. Voedeloosheit, Dut. Atrophia, Somn. Magrezza Ital. Wasting, Eng.

1. DEFIN. The diminution of a part or of the whole frame, owing to which its natural dimensions are necessarily reduced.

2. The healthy proportions of the various parts of the frame are preserved by their natural endowment, and are intimately dependent upon the conditions of this influence. When it preserves its due relations throughout the frame, a continued vital attraction of molecules from the blood takes place, to an extent sufficient to supply the place of those particles, which, having lost their vital affinity, are removed by absorption. This slow process, by which animal particles are taken away, for a time, from the current of the circulation, assimilated in the various tissues, afterwards detached from them when they no longer are suited to the purposes of the structure, and carried back to the circulating current to be partly eliminated from the frame, and partly changed into different conditions, is not infrequently liable to be disturbed in some one of its parts or steps. Thus, when the vital influence of an organ, or of the whole frame, is in a state of activity the attraction of molecules from the blood, similar to those constituting the different tissues, is energetic, and extended to a greater number of such molecules,—they are held in closer affinity, and the bulk of the part is increased. But when the state of the vital endowment is reversed, when it is weak or depressed, this attraction proceeds slowly and languidly, and, the existing affinity being also weak, the molecules composing the tissues are sooner removed by the process of absorption than in health, and the part thus circumstanced is wasted, from a more rapid loss of its molecules than can be supplied by the low state of vital affinity. Thus, as in the former case, a double condition of the organisation, but of opposite natures, actually obtains; namely, the attraction is extended to fewer molecules, and the affinity between them is more languidly exerted, they being more rapidly carried,

by the process of absorption, back into the blood, from whence they came, in order to be partly changed and partly eliminated from it; and the part thus affected, instead of retaining its healthy proportions, becomes wasted, deficient in its constituent molecules, or atrophied. Thus we perceive that there is a continued circulation of nutritious particles in the very tissues which they compose; that this circulation, and the affinity which preserves them in their spheres, is vital, influenced by, and fluctuating with, the various conditions of the vital endowment of the frame, the nutrition and bulk of a part being intimately dependent upon it.

3. Nutrition being, then, the result of a vital attraction exerted between the molecules of matter constituting the elementary tissues, and those which are similar to them in the blood, and being co-ordinate with the strength of that attraction, atrophy necessarily proceeds from a diminution of this affinity, and the more rapid transit, consequent upon the diminution, of the particles which have been attracted, back into the current of the circulation. The healthy proportion of the tissues is therefore continued by a due equilibrium being preserved between the attractive influence on the one hand, and the continuance of vital affinity on the other. When either the attraction is active, or the circulation long, the bulk of the part will be increased; but when the former is deficient, or the latter of short continuance, atrophy will necessarily result.

4. The truth of these propositions is evident from a consideration of the various phenomena of health and disease, and by the numerous contingent circumstances which influence the conditions of the different structures of the body. At this place I will briefly describe, *first*, the appearances which atrophied structures assume; *secondly*, the various causes and circumstances which, influenced by the vitality of the frame, produce this change; and, *thirdly*, the treatment that may be employed to remove it. Thus I will confine myself, at this place, entirely to the consideration of atrophy, in its *generic* acceptance; the *species* being treated of under distinct and separate heads.

5. *A. States or appearances of atrophied parts.*—Atrophy may be confined to particular structures; it may affect only a particular constituent tissue of an organ, whilst its associated tissues are hypertrophied, and it may extend to various contiguous structures or unconnected organs. A particular constituent tissue may, however, be wasted, and yet its associated structures may be augmented in bulk, as I have shown occasionally to occur, when describing the morbid states of the liver. When this takes place, either no diminution, or an actual increase of the whole organ, is observed. When a compound organ, or part formed of various elementary tissues, is atrophied in all its constituents, the diminution of volume is then very remarkable; although, in some cases, as when the atrophy consists chiefly of a rarefaction of the internal structure of an organ, as of the lungs and bones, the external surface presents little or no change.

6. The earliest and most essential change in an atrophied part is diminution of the quantity of blood sent to it; and next to this, and chiefly owing to it, is greater paleness of colour. Sub-

sequently the organisation is still more completely changed; so much so, frequently, that all traces of its original conformation are lost, and the part is reduced to the state of cellular or fibro-cellular tissue, generally of small size. In some cases, the part is not only extremely atrophied, but at last disappears altogether. When membranous structures are atrophied, they become much thinner and more diaphanous than natural, or even perforated.

7. The atrophy of certain organs or parts is a natural or healthy change, as respects the fetus in utero, and the newly-born infant. The parts which experience those changes are too well known to require notice. Several structures, especially muscular parts, sometimes have preternatural quantities of fat deposited on their surfaces during the progress of atrophy. This is often observed in respect of the heart, and appears to result from the same causes; namely, diminished vital energy, occasioning insufficient nutrition or assimilation (§ 2, 3.), and a morbid secretion of fat, which often is as much a consequence of diminished vital energy, as insufficient nutrition of the different structures is the result of this state, both changes being, in some cases, merely grades, in others modifications, of the same vital manifestation.

8. Various parts of the body naturally undergo marked atrophy during advanced age. Of these the most remarkable are the generative organs, particularly the ovaria, mammary glands, testes, the thyroid gland, the bulbs of the hair, adipose tissue, the lungs, and bones. Atrophy of these and other parts has received a more particular notice under their respective heads. I may, however, remark, respecting the atrophy which results from age, that it is very evidently the result of diminished vitality, especially as those parts which first experience a loss or diminution of their functions, either from age or exhaustion, are the first to be atrophied; and that it often differs from other forms of atrophy, in consisting merely of a deficiency of the fluid constituents of the structures—in a condensation and dying of the organs, and not of a loss of the molecules constituting their solid parts.

9. *B. The secondary causes which, under the influence of the vitality of frame, produce atrophy,* are, 1st, Original deficiency of development, constituting *congenital atrophy*. This state of atrophy may exist in every grade, and may amount to a total absence of an organ or part. When it takes place to this extent, it has evidently arisen from an arrest of the formative process, or of the development of the tissues, in consequence of disease of the embryo. If the disease affect the nervous centres, the parts supplied with nerves from them are sometimes either much atrophied or altogether wanting, as M.M. KOSTAN and SZANES have shown. But this is only an occasional occurrence; for parts of the brain or of the spinal chord have merely consisted of a serous sac, and yet the organs of sense and the limbs have been fully developed; and there have occurred many cases in which both brain and spinal chord have been entirely wanting, and yet the nerves proceeding from them, and the organs which the nerves supply, have been fully formed; evincing the truth of the doctrine stated by the writer many years since. (see *London Med. Repos.* vol. xvii. for May, 1822;

and *Notes to RICHERAND'S Elements of Physiology*, 1st ed. 1824.), that the nerves are first formed, and the cerebro-spinal centres subsequently developed.

10. 2d. A diminution of the influence of those nerves which preside over the circulation of a part, and its assimilative and proper functions, rapidly reduces its volume. It is chiefly owing to this cause that the organs of generation waste in old persons. The ganglia which supply these organs, in both sexes, become, in old age, small and indistinct; and the nerves which issue from them to these parts can scarcely be traced. I have no doubt that a similar result follows injury or change of the ganglia or ganglionic nerves in other parts of the body. The paralysis attendant upon painters' colic is generally accompanied with great wasting. In cases of unreduced dislocation, when the head of the bone presses upon the nerves, wasting is a frequent consequence, chiefly owing to the incapability of exerting the voluntary muscles, which are rapidly atrophied when they remain inactive. Injuries of nerves, of whatever description, that interfere with their functions, will, as shown by BELL, LÖBSTEIN, and several others, occasion atrophy. But I may add, that whilst injuries of ganglionic nerves will produce it directly, by arresting the nutritive actions, injuries of voluntary nerves occasion it indirectly only, and chiefly by depriving the muscles of their contractile powers, and reducing them to that state of inactivity which is more or less rapidly followed by atrophy. This is proved in the numerous instances which come before us of paralysis originating in the brain. The wasting of the paralysed limb in these cases is seldom great, and it is chiefly limited to the muscles; the other structures, particularly the cellular and adipose, being unaffected.

11. 3d. Diminished supply of blood is a very frequent cause of atrophy. This may be local, as in cases of obliteration of a large arterial trunk, and when the functions of an organ cease. In many such cases, however, the obliteration may be the consequence of injury of the ganglionic nerves which supply the artery, or of the cessation of the functions of the part. The general state of atrophy which occurs after tubercular formations in the mesenteric glands, or in the lungs, is, generally, partly owing to the diminution of the entire mass of blood, together with lowered vital influence; the nutritious molecules, and the assimilating or attractive power being both deficient. A similar inference may also be extended to the wasting accompanying idiopathic anæmia.

12. 4th. When the functions of a part or organ are arrested, atrophy always results. This is remarkably the case in respect of the voluntary muscles (§ 10.). On the other hand, increased function of an organ contributes to augmented volume. The urinary and generative organs furnish well-known proofs of those positions, and illustrate those with which I commenced, namely; that nutrition, and consequently atrophy, most intimately depend upon the states of vital manifestation of an organ or part. Other organs incapacitated from acting also undergo a marked diminution of their size. Even the lungs, when the principal bronchial tube of one lobe is obstructed, will experience atrophy of that lobe, as MM. REYNAUD and ANDRAL have shown.

In cases of death from hunger, the stomach and large bowels appear wasted.

13. 5th. Atrophy will also present itself as a consequence of inflammation; and, in some cases, will amount to obliteration or disappearance of the part. Such changes are not infrequent in blood-vessels and excretory ducts. It is sometimes observed in the spleen, liver, and gall-bladder; the last of which has been observed to be wanting or entirely obliterated from this cause. In the majority of such cases, the atrophy has proceeded from obstruction to an artery or vein having occurred during the disease, probably from the extension of inflammation to them, or from the pressure of some of the usual products of the inflammatory state.

14. C. TREATMENT of atrophy. — In all these circumstances under which atrophy occurs, it will always be observed that the vital energies, in some one or other of its manifestations, are diminished or perverted — most frequently the former. This fact furnishes us with the most rational indication as to the removal of the morbid state which it occasions. Having first ascertained the circumstances and pathological states of the atrophied organ, we are to direct our attention to remove them as far as may be possible. We are to endeavour to restore the natural vital energy of the part, by exciting its functions, and promoting the contractile powers. Knowing that, by increasing the actions of a part, we thereby increase its nutrition and bulk, we should endeavour to apply the means to the removal of atrophy, but in a cautious avoidance of fatigue, or exhaustion being occasioned by the means we use, or this purpose. When the atrophy seems to depend upon the development of tubercles, or upon engorgements of lacteal glands or tumours pressing upon nerves or large vessels, the preparations of iodine are indicated, on account both of their influence in removing these tumours, and of their excellent tonic powers when judiciously administered. In many cases the functions of the digestive organs — stomach, liver, and bowels — are torpid, and consequently the nutritious fluids are not sufficiently prepared to be assimilated in the different tissues. Healthy chyle is not supplied in the requisite quantity, or, if supplied, is not converted into healthy blood for the nourishment of the structures. In these cases, although the energy of the whole frame is deficient, yet our principal means of medication are to be directed to these organs. (See art. CONSUMPTION, MARASMUS, MESENTERIC DISEASE, and TABES DORSALIS.)

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AUSEULTATION. — (From *ausculto*, I listen.) PATHOLOGY, Semeiology. — 1. This term is applied to the methods used to ascertain the seat and nature of disease, by the signs which may be recognised by the sense of hearing. It comprises the study of all sounds indicative of disease, whether heard by the unassisted ear, or through the medium of instruments; and whether arising naturally, or produced artificially. The observations I have to offer upon this mode of investi-

gating disease may be arranged in the following manner; but I shall confine myself at this place to the consideration of the first class of signs, and devote to the second class a distinct article. (See PERCUSSION.)

2. I. SIGNS FURNISHED BY SOUNDS PRODUCED NATURALLY WITHIN THE BODY.

A. Sounds having their seat in the chest. — *a.* Depending upon the passage of air during respiration. *b.* Proceeding from the action of the vocal organs. *c.* Depending upon the action of the heart.

B. Sounds having their origin in the arteries.

C. Sounds seated within the abdomen. — *a.* Proceeding from air in the digestive tube. *b.* Depending upon the foetal circulation.

11. SIGNS FURNISHED BY SOUNDS PRODUCED ARTIFICIALLY. (See PERCUSSION.)

3. HIPPOCRATES remarked that the existence of fluids in the thoracic cavity might sometimes be ascertained by applying the ear for some time to the side of the chest; and our countryman HOOK (*Posthumous Works* p. 39. &c.), in several very pointed observations, not only stated the importance of attending to the sounds produced by the "internal motions and actions of bodies," but also of rendering them sensible so as to distinguish between them; for the doing of both which, he thinks, "it is not impossible, but that in many cases there is much to be found." M. DOUBLE, also, was the first of applying the ear closely to all parts of the chest, in order to examine the signs furnished by the action of the heart, ~~and~~ respiration; and published his recommendation to cultivate the means of diagnosis, in his able work of *Seméiologie*, two years before the appearance of M. LAENNEC's celebrated production. Although, therefore, M. LAENNEC may not have been the discoverer of the importance of auscultation in the investigation of disease, yet is he clearly entitled to the honour of discovering *mediate* auscultation — of inventing the stethoscope — and not only of bringing both these modes of examination into general use, but also of strongly recommending percussion, and of improving, in a very remarkable manner, our knowledge of the pathology of pectoral diseases.

4. It is unnecessary to occupy my limits with a description of the instrument termed the *stethoscope*, as its construction, with the improvements of M. PROBY, and the acoustic principles on which it assists the sense of hearing, have been frequently described, and are so simple, as to be readily understood, even by those who are not already acquainted with it. I may remark at this place, that auscultation, like every other method of investigation, requires practice for its perfection. The young practitioner should therefore early commence the study of the sounds of respiration and of circulation, at first with the unaided ear upon the healthy subject, and preferably on children, from five to twelve years of age, as in them all these sounds are distinct, and seldom modified by organic disease. Having made himself familiar with these sounds, by frequent recourse to this practice, he may provide himself with the cylindrical stethoscope in general use, and with the one called PROBY's; and, with their aid, continue his study of the sounds produced within the living body.

5. Having limited myself at this place to the consideration of the SIGNS FURNISHED BY SOUNDS

PRODUCED NATURALLY WITHIN THE BODY, whether heard by the unassisted ear, or by the aid of the stethoscope, I proceed, first, to notice the sounds having their seat in the chest and throat. These sounds are chiefly produced by the natural movements of the parietes of this cavity, and of the organs contained within it, and consist of, 1st, those of respiration; 2d, those of the voice; and, 3d, those of the heart. These will be successively considered.

6. I. AUSCULTATION OF RESPIRATION. — *A. Of the healthy and simple respiratory sounds.* The passage of air into, and out of, the lungs occasions a somewhat different sound in various parts of the chest, owing to the difference of size of the tubes through which the air passes. Hence the respiratory sound has one character in the small bronchi and air-cells, another in the large bronchi, and another in the trachea. These sounds have been respectively denominated, by LAENNEC, ANDRAL, and WILLIAMS — the best writers on auscultation — vesicular, bronchial, and tracheal. The tracheal sound is heard in the anterior and lateral parts of the neck, the upper portion of the sternum, and the sternal part of the subclavian regions. The bronchial respiration is heard in the middle portion of the sternum, and parts of the mammary regions contiguous to it, and in the axillary and interseapular regions. Vesicular respiration is perceptible over the remaining parts of the chest in health. These sounds are double; the one being that of inspiration, the other of expiration. The former is much stronger than the latter, which is often scarcely to be heard by the unpractised ear, unless assisted by the stethoscope.

7. It is difficult to describe these sounds with accuracy. The vesicular sound is a dull and diffused murmur, or a feeble breathing, resembling that proceeding from the passage of the air through the nostrils in a healthy and quiet sleep. The bronchial respiration is more tubular and blowing, and is chiefly confined in health to the situation of the largest bronchi. The tracheal sound merely conveys the idea of air passing through a tube of larger calibre, and is more hollow and blowing.

8. The respiratory sounds vary in their intensity, not only in different persons, but also in the same person, at different epochs of life, and at various times. The thickness of the parietes of the chest does not materially diminish their intensity; but the activity of the respiratory function affects them most materially; this function presenting different grades of activity in different persons. Dr. WILLIAMS has remarked that they are more distinct after febrile and moderate exercise. After excessive exertion they are diminished. Fear, and the depressing passions, have a similar effect.

9. The respiratory sounds are greatly modified by age. From birth to the period of puberty, they are much louder and shriller than in after life, and the whole respiratory function more active. This state of the respiration has been called *puerile* by LAENNEC; and occurs sometimes in adults, either generally or partially, from momentary excitation, or the presence of disease in a part or parts of the lungs. At puberty the respiration is less noisy; and in a few years becomes much deeper, and assumes the adult character.

10. The vesicular sound being the result of the perfect penetration of the air into the lungs, its equal and simple presence is a sign of the healthy performance of the function. But this sound may vary in degree. It may be feeble in all parts, owing to constitutional peculiarity, or only in particular parts, when we should suspect disease; but it is no proof of disease, unless it be associated with certain peculiarities of sound hereafter to be noticed. The total absence of respiratory sound in a part indicates either the exclusion of the air from the part of the pulmonary tissue underneath, or effusion of fluids, or the introduction of air into the pleura. Here we must have recourse to *percussion*, in order to give precision to the information. (See *PERCUSSION*.) In some cases the natural vesicular sound is absent, and a bronchial respiration is heard. In these we must infer that the vesicular murmur is suppressed by a condensation of the pulmonary structure, which, owing to this change, becomes so good a conductor of sound, that the bronchial respiration either becomes louder or is heard in unusual places. In other cases, a sound resembling the tracheal is heard in situations where vesicular respiration alone exists in health. This is caused by the passage of air into an ulcerated cavity or cavern communicating with the bronchi, and from this circumstance is called *cavernous respiration*.

11. *B. Of the morbid respiratory sounds.*—The respiratory sounds are not only varied in degree, but also in kind, or they are mixed with different adventitious sounds. These variations of kind are produced, 1st, by changes in the parietes and vicinity of the tubes, and in their secretions; and, 2d, by morbid states exterior to the pulmonary tissue. Under the first of these are ranked the different varieties of sound produced by the presence of morbid secretions within the air-tubes, and the lesions producing these secretions. This class of morbid sounds have been variously denominated. By the French they have been named *râle*; by some of our own writers the word *rattle*, and by Dr. JOHNSON the word *wheeze*, have been used. As we have no English term which so fully expresses the idea, to which this morbid sound gives rise, as the word *rhonchus*, adopted by Dr. WILLIAMS, and some French pathologists, I shall use it here.

12. *a. Moist crepitous rhonchus*, the *râle crepitant* of LAENNEC; the *crepitant rhonchus* of Dr. WILLIAMS, has its seat in the air-cells and minute bronchi. It resembles the sound from rubbing a lock of hair between the finger and thumb, when held close to the ear; or the crepitation of a piece of lung distended with air when compressed. It is generally uniform, and continues to the end of inspiration, and seems to arise from diminished calibre of the minute bronchi, owing to interstitia, effusion, and the admixture of the respired air with the secreted or effused fluids in the air-cells and tubes. It is characteristic of incipient hepatisation of the lungs from pneumonia, and of its resolution; of œdema and apoplexy of the organ; sometimes of early phthisis, of pulmonary catarrh, and bronchitis. But it is only pathognomonic of the first stage of pneumonia; and the more viscid the mucus that is secreted, the more distinct is the crepitant character of the rhonchus. In the

other diseases in which it occurs, the crepitation is less perfect.

13. *b. Dry crepitous rhonchus*, the *craquement* of LAENNEC, resembles the sound produced by blowing into a dried bladder, and conveys the impression of air distending lungs that have been more or less dried, and whose cells have been unequally, but much dilated. It is only heard during inspiration, and occurs only in pulmonary emphysema.

14. *c. Dry bronchial rhonchus.*—This is either *sibilous*, *râle sibilant sec*; or *sonorous*, *râle sonore sec*, of LAENNEC. The former is a low or loud, shrill or bass, and prolonged whistle, such as may be produced by air passing through a small circular aperture, and is owing to some contraction or constriction of the bronchi. The latter is a dull, prolonged, snoring sound; sometimes very loud. It occasionally resembles the bass note of a violoncello, or bassoon, or the buzzing of an insect. It seems to be produced by a flattened contraction in a bronchus of considerable size, leaving very little aperture; and arising from external pressure of the bronchial tube, from local thickening of its mucous lining, or from tenacious mucus within its canal. In a modification of the rhonchus, which Dr. WILLIAMS calls *dry mucous rhonchus*, the sound resembles that of a whee, and is produced by a portion of very anastomosing mucus attached to the bronchial lining, when, yielding with a jerking resistance to the air forcing its passage, thereby occasions a ticking sound.

15. *d. The mucous rhonchus*, the *râle muqueux* of LAENNEC, the *humid rhonchus* of Dr. WILLIAMS, takes place in the bronchial tubes, and is produced by the passage of air through a thickish fluid, giving rise to a kind of bubbling within the air-tubes. It is most frequent in bronchitis and pulmonary catarrh, accompanied with mucous secretion; in hæmoptysis, in phthisis, in pneumonia, and in other diseases which are attended at any period with expectoration. This rhonchus is more gurgling, loud, irregular, and coarse, the larger the bronchi in which it is seated, the bubbles being there larger and more unequal. In the trachea, these characters are particularly marked, and have been denominated *tracheal* from this circumstance, by M. LAENNEC. In the smaller bronchi, on the other hand, this rhonchus is more equal, and its characters less remarkable, the bubbles being of much smaller size. The bubbles producing the mucous rhonchus must necessarily vary in their characters with the varying fluidity of the secretion, and thus the rhonchi will differ accordingly. If the fluid be very thin, the bubbles will be numerous, readily formed, and rapidly break; but if it be viscid, they will be fewer in number, and will often pass along the tubes for some way before they break, the sound being diffused, more regular, and rare. Also the continuance of the rhonchus will be an indication of the quantity of liquid present in the bronchi, as justly remarked by Dr. WILLIAMS. If this rhonchus accompany only the first part of inspiration and the end of expiration, the secretion must be scanty. But if the whole of the respiratory act be attended with this sound, then we may conclude that the quantity of fluid is considerable, and extends to the smaller bronchi.

16. *e. The cavernous rhonchus*, or *gargouille*.

ment, the *mucous rhonchus* of morbid excavations in the lungs, occurs when these cavities contain a fluid, and communicate with the bronchi. It generally exists in the advanced stage of tubercular phthisis, in abscess, and partial gangrene of the lungs. This rhonchus is characterised by a strongly marked mucous gurgling or bubbling sound, confined to a small spot and determinate situation, and is particularly marked upon the patient taking a full inspiration, or after coughing.

17. It may be remarked that this class of morbid respiratory sounds — proceeding from changes in the parietes of the tubes, and in their secretions — will sometimes be more or less obscurely heard through effusions in the pleura, when not very large. I proceed to consider the second class of morbid sounds, or those arising from lesions exterior to the pulmonary tissue.

18. a. *Metallic resonance, intement metallique* of LAENNEC, is observed only when a quantity of air is accumulated in the pleural cavity, as in pneumothorax; or rarely in cases where very large tuberculous excavations are formed in the lungs. It is most commonly heard when both air and fluid are effused in the pleural cavity, and when there is a communication between this cavity and the bronchi. It is most distinctly heard upon coughing. LAENNEC has distinguished two varieties of this sound, namely, *metallique*, and *amphoric* *buzzing* or *resonance*. These sounds are occasioned by the impulse given to the air accumulated in the pleura, by the vibrations of air rushing out of a fistulous opening in the pulmonary pleura, or striking against a condensed part of the pulmonary tissue, or of the pleura itself.

19. b. *Rubbing sound, the sound of friction, the bruit de frottement ascendant et descendant* of LAENNEC. This sound has been particularly investigated by MM. HONORÉ and REYNAUD. It is an obscure, dull sound, perfectly distinct from the respiratory sounds, but synchronous with the motions of the parietes of the chest during inspiration and expiration, and resembling that produced by the rubbing of two soft and somewhat rough bodies on each other. It is loudest, or only heard, during inspiration. It is sometimes present in interlobular emphysema, but is more frequently and sensibly heard in pleuritis, with partial albuminous exudation, and with little or no effusion of serum.

20. II. AUSCULTATION OF THE VOICE. — The voice, although produced chiefly in the larynx, has its sound partially propagated inwards by the air in the trachea and bronchi, occasioning, in the smaller ramifications of the latter, a vibratory sensation or fremitus, rather than a distinct sound to the ear through the stethoscope; but, in persons with a large chest and strong voice, a more distinct vocal resonance. When the instrument is applied in the situation of the larger bronchi, as between the scapulae and under the axilla, the voice is heard much more distinctly, and the articulation may even be distinguished; but the sound does not seem to enter the cylinder, or to traverse its tube. If we place the stethoscope on the trachea or larynx, when the patient is speaking, we hear the whole of the words, loudly and articulately, and as if passing through the instrument to the ear. These sounds have been called, from their site, *bronchophony* and *laryngophony*; and

arise from the vibrations propagated through the air contained in the trachea and bronchi, and which become weaker as they extend in the direction of the air-cells.

21. The degree of vocal resonance in the chest differs in different persons. It is loudest and most extensive in those who are thin, and have a strong, sharp, treble voice; so that natural bronchophony will extend further in young subjects and in females, particularly through the upper regions of the chest. In fat persons with a deep voice, the natural bronchophony is confined and obscure, especially during the deeper notes. In all the lower parts of the thorax, particularly during the deep tones of the voice, there is either no resonance, or merely a slight thrill or vibratory fremitus, which may likewise be felt upon applying the hand to its parietes. Such are the healthy sounds of the voice in different parts of the chest; but in certain states of disease they are very materially altered, and both the *bronchial* and *laryngeal* sounds are developed in places where they never exist in health. Of the various manifestations of these sounds in disease, I now proceed to take a brief notice.

22. a. *Bronchophony* is developed in disease by the same causes that render the bronchial respiration audible, viz. condensation of the substance of the lungs in the vicinity of large bronchial tubes, without diminishing their calibres, as in hepatisation or induration, from the formation of tubercular matter. From this circumstance bronchophony is an important symptom in pneumonia and phthisis. When the condensation is seated near the surface of the upper portions of the lung, and near a large bronchus, the sound may nearly approach laryngophony. The bronchial respiration is generally present with bronchophony, excepting when the hepatisation is extensive.

23. b. *Ægophony* (from *æg*, *ai*, a goat, the sound resembling the cry of this animal,) is merely a modification of bronchophony; and occurs when, with the circumstances which produce it, there are superadded the existence of a thin layer of fluid between the surface of the lungs and the pleura costalis. The bleating sound of the voice to which the term ægophony has been applied is variously modified in different persons, according to the natural tone of their voice, and the different modifications of the diseases which produce it: thus it will resemble the squeaking of a Punch; or possess a shriller or sharper key, and sound more like the echo of the patient's voice than the voice itself. Ægophony only exists in pleurisy or slight hydrothorax, when the quantity of fluid effused is no more than forms a thin layer between the lungs and parietes of the chest. LAENNEC states that he has found this symptom present in almost every case of pleurisy; and considers it to be owing to the natural resonance of the voice in the bronchial tubes, rendered more distinct by the compression of the pulmonary texture, and modified by its transmission through a thin layer of fluid in a state of vibration. Dr. WILLIAMS ascribes it to "the successive undulations of the liquid, the result of an irregular transmission of the sonorous vibrations." Ægophony often co-exists with bronchophony, and the one passes into the other.

24. c. *Pectorilology*. — The existence, in disease, of vocal resonance in any part of the chest, to the extent of laryngophony, has been termed *pectorilology* by LAENNEC. It may be either *imperfect* or *perfect*. It is the result of a morbid cavity, formed in the substance of the lungs, and communicating with the bronchi; to which cavity the sound of the voice, or vibrations of the air in the tubes, is propagated. When the stethoscope is applied to a part of the chest, under which one of these cavities is situated, the words which the patient utters seem to proceed from that spot; and hence the term *pectorilology*. "The distinction between perfect and imperfect pectorilology is, as in the case of natural resonance, whether the voice seems to traverse the tube, or remain at the end; and the physical difference producing the two modifications consists in the size and situation of the cavity. The most perfect pectorilology is produced in cavities of moderate size, which are situated near the surface of the *f. l.*, and freely communicate with a large bronchial tube. If the cavity be deep-seated, or if its communication with the bronchi be imperfect, the resonance of the voice will not amount to perfect pectorilology. True pectorilology produced by a cavity, is generally distinctly circumscribed, so that its limits can be distinctly traced." — (WILLIAMS'S *Rational Exposition*, &c. p. 43.) ANDRAL appears to be correct in considering perfect pectorilology as not common, and that the imperfect state of this sound; or bronchophony, is very frequently mistaken for it. When present in any part of the chest where there is naturally no bronchial resonance, it may be considered as a certain indication of the existence of a morbid cavity, generally tubercular; and when heard in situations of natural bronchial resonance, although more doubtful, yet if it be perfect, distinctly circumscribed, and heard on one side only, the same conclusion must be come to. It may be further added, that an empty state of the cavity, its rounded and regular shape, and natural sharpness of the voice, particularly in women and children, tend to render pectorilology perfect.

25. 111. AUSCULTATION OF THE HEART. — A. In its healthy state. I have always viewed LAENNEC's explanation of the sounds proceeding from the heart's contractions as the most defective part of the exposition of his system; and a similar opinion seems to have been entertained by Mr. TURNER, Dr. WILLIAMS, and several others. The observations of Mr. TURNER, and of Drs. STOKES and CORRIJAN, first shook the stability of the views of LAENNEC on this subject; and the recently published researches of Dr. HOPE have almost altogether overthrown them. As I consider the exposition of the actions and sounds of the heart, given in Dr. HOPE's work, to be the most accurate, I shall follow it on this occasion.

26. 1st. *Of the Contractions of the Heart in the order of their occurrence, &c.* — The first motion of the heart following the interval of repose, is the systole of the auricle. It is a very brief and slight contractile movement, most considerable in the auricular appendix, and propagated toward the ventricle, in the systole of which it terminates, by a nearly a continuous action. The systole of the ventricle commences suddenly, and diminishes considerably the volume of the organ. "Synchronous with the systole are the first sound, the impulse of the apex against the ribs, and the

pulse of the vessels near the heart; the pulse at the radial arteries following at a nearly appreciable interval. The diastole of the ventricles follows their systole; and these compartments return, by an instantaneous expansive movement, to the same state as during the previous interval of repose. The diastole is accompanied with the second sound, with a rush of blood from the auricle, by a contractile motion of this cavity most observable at its sinus, and by a retrocession of the apex of the heart from the ribs. "Next succeeds the interval of repose, during which the ventricles remain at rest in a state of fullness, though not of distension, through the whole period intervening between the second and the first sounds; but the auricle remains at rest during the first portion only of that period, the remainder being occupied by its next contraction, with which recommences the series of actions described." — (HOPE on the Dis. of the Heart, &c. p. 40.)

27. The rhythm of the heart, or the duration of the several parts of this series of actions, constituting what may be called a beat, is the same as described by LAENNEC: — 1st. The ventricular systole occupies half the time of a whole beat; 2d. The ventricular diastole occupies a fourth, or one-third; 3d. The interval of ventricular repose occupies a fourth, or rather less, during the latter half of the auricular systole takes place.

28. 2d. *Causes and mechanism of the motion.* — The auricles, being always in a state of fullness, arrive during the first half of the period of repose of the ventricle, at a state of distension, on which they react and propel a small additional quantity of blood into the full but not yet distended ventricles, in order to bring them to this state, and to cause them to react, and thus expel a greater or less portion of their contents. During the expulsion of the contents of the ventricles, Dr. HOPE considers that the apex of the heart is tilted upwards and forwards, and occasions the impulse against the ribs, in consequence of the retraction of the ventricles upon their base, and on the auricles, which, being in a state of extreme distension, serve as a fulcrum beneath them. The diastole of the ventricles appears to be occasioned, 1st, by the relaxation of the principal part of their muscular structure, assisted by an elastic property; 2d, by the distension of the auricles, which has arrived at its height, and brings into action certain layers of ventricular fibres having a powerful influence in distending these cavities; 3d, by the width of the auriculo-ventricular opening, which allows the blood to rush instantaneously, and with facility, from the auricles into the ventricles. The blood expelled from the former cavities into the latter being instantly replaced from the venæ cavæ, distension of the auricles immediately recurs, and the same series of actions is continued.

29. 3d. *Causes of the sounds.* — There can be no doubt that the sounds of the heart's actions are not produced by the mere contraction of its muscular structure. To what other cause can we impute them? I conceive that they can only be referred to the action of the parietes of the cavities on the fluid circulating through them, and to the motions of this fluid. According to this view, which has been very diligently investi-

gated by Dr. HOPKINS, the systole of the ventricle is the cause of the first sound, by the impulse it communicates to the blood, and the diastole of the ventricle is the cause of the second sound; owing, in the opinion of this writer, to the rush of blood from the auricles, produced as already explained (§ 26.), and the succession of the stream against the walls of the ventricle, when abruptly arrested by the completion of the diastole.

30. I consider that it is clearly made out, 1st, That the impulse, the pulse, and the first sound, coincide; 2d, That the ventricle is concerned in the production of the second sound, although the exact manner, in which the motions of the ventricle and this sound are connected, has not yet been conclusively ascertained; and, 3d, That the actions of the auricles are insufficient to produce either impulse or sound, and that neither the one nor the other result from them. With respect to the production of the second sound, I think that the opinions of Mr. TURNER, Dr. CORRIJAN, and Dr. WILLIAMS, are untenable, and therefore may not be stated; and that the explanation of Dr. HOPKINS requires further confirmation. From the third of these facts I believe that it may be legitimately inferred, that the physical signs of disease of the auricles are very imperfect, and therefore uncertain.

31. *B. Auscultation of morbid sounds and impulse of the heart.* — *Of the impulse of the heart.* Although, strictly speaking, the sounds of this organ are only objects of auscultation, yet, as the impulse or shock it communicates to a part of the chest is usually made a matter of enquiry, although by a different sense, during the time that auscultation is being performed, I will briefly notice it at this place. The impulse necessarily varies, even in health, in different persons, with the state of the heart's action, and the habit of body. It is also greatly modified by mental emotions, and by various affections of the digestive and other organs. It is always synchronous with the first sound of the heart; but, in rare cases, a slight second impulse also accompanies the second sound; but this is felt deeper in the chest; is more of an obscure tremor, much slighter in degree than the chief impulse or shock, and is only met with in cases of hypertrophy with dilatation.

32. When the impulse is prolonged, strong, and characterised by an extensive heaving movement, thickening of the walls of the ventricles may be inferred. It should, however, be recollected, that whatever excites the feelings of the mind, or hurries the circulation, will occasion a strong impulse; but, in such cases, the actions of the heart are also unusually frequent. *Morbid impulse of the heart* is present in the states of both mental and corporeal repose; and is often unconnected with increased frequency, as in hypertrophy of the ventricles.

33. The impulse may be diminished, even in health, as by the depressing passions. It is often constitutionally so small in amount as scarcely to be felt. It is also lowered by diseases of remote organs, as diarrhoea, &c., and by abstinence and blood-letting, and whatever depresses the energies of the system. It is generally weak in congestion of the cavities of the heart, in cases of thinning of their parietes, in the asthmatic paroxysm, in

congestion of the lungs, in some cases of pneumonia, and in the advanced states of various diseases; and it may even, although very rarely, accompany certain states of hypertrophy of the heart, particularly during the operation of debilitating causes.

34. In health, the impulse is usually limited to the immediate region of the heart, and chiefly in the situation of the cartilages of the fourth, fifth, sixth, and seventh ribs. Its sphere is extended by increased action of the organ, whether the result of mental or corporeal excitement or of disease; by hypertrophy, and by certain organic changes of organs in the immediate vicinity. When the muscular parietes of the heart are increased without any dilatation of the cavities, the sphere of impulse is not extended far beyond its healthy site; but when dilatation is combined with hypertrophy, the impulse may often be felt on the right side of the sternum, below the clavicles, and even on the back. Diseases of adjoining organs, as hepatisation of parts of the lungs in the vicinity, effusions of fluids in the pleural or pericardiac cavities, tumours in the mediastinum, close adhesions of the lungs to the costal pleura, adhesion of the pericardium to the heart, displacement of the heart, and even an enlarged liver or spleen — when rising into the thoracic cavity, and pressing the diaphragm upon the pericardium — will extend, often to a considerable distance, the impulse of the heart, owing to the increased density of parts which receive the shock. Much discussion has arisen as to the manner in which the heart's shock is produced. Further than that it is occasioned by the muscular actions of the organ, I believe that the phenomenon has not been satisfactorily explained, at least in such a way as accords with the various conditions it presents in health and disease. The explanation given by Dr. HOPKINS has been already stated (§ 28.).

35. *2d. Of the changes produced in the natural sounds of the heart by disease.* — The sounds of the heart vary in different persons, even in health. In some they are loud and distinct; in others, the reverse: they may also be dull or clear, in respect of their key. They are generally distinctly heard by the unaided ear; but more accurately with the stethoscope. The impulse and sound are never both present in health, to a great degree, as they depend upon opposite conditions of the ventricles; the impulse being great in proportion to the thickness of the parietes of the ventricles, the sound to their thinness. The sounds of the left side of the heart are strongest at the junction of the cartilages of the left fourth, fifth, sixth, and seventh ribs, with the sternum: those of the right side, under the sternum and towards its right edge. The sphere of the heart's sounds is, in a very few persons, nearly limited to the sphere of impulse; but it is generally far more extended, even in health. It should not be overlooked, that the sphere of sound is much larger in children and young persons, in females, in the lean, and in those who have narrow or small chests; whereas, in persons whose thoracic cavity is large, and its parietes thick, muscular, or fat, the sound is heard much less extensively.

36. The sphere and loudness of the heart's sounds are increased by the same moral, physical, and morbid causes, which have been stated to

augment its impulse (§ 31.). Therefore, when frequency of pulse accompanies increase of sound, no actual disease may exist; but when a natural or slow state of the pulse is attended with an augmented range of sound, disease may be much more certainly anticipated. The circumstance of the sphere of sound being extended by the organic lesions already noticed as conveying the impulse of the heart (§ 34.), and by tuberculous excavations in the lungs, should not be overlooked. In taking account of the heart's sounds, we should also be aware that the sounds of respiration will occasionally mask them, as the heaving of the chest during inspiration will, in a slight degree, mask some of the shocks of the heart. Generally, the sounds of the heart are strongest in the left anterior part of the chest; and progressively weaker in the sternal, in the right anterior, the left posterior, and in the right posterior parts successively. If this succession be deviated from, or in any way ^{interfered} ~~interfered~~, disease exists; and the degree, state, and order of deviation, become signs of some importance. It has been remarked by LAENNEC, that, when the sounds are heard beyond the healthy sphere in persons with the chest well formed, and presenting none of the causes alluded to as giving rise to an extensive range, these persons will be found to be subject to palpitations, to shortness of breath upon the slightest exertion, to attacks of asthma, and to congestions of the internal viscera.

37. 3d. *Of the adventitious sounds of the heart.*—The sounds of the heart may not only be changed in degree, in extent of sphere, and in the succession of intensity, but entirely new sounds may be superadded. The most common of these are the bellows sound (*bruit de soufflet*), the saw sound (*bruit de scie*), and the rasp sound (*bruit de râpe*). These may either take the place of the natural sounds, or may be conjoined or superadded to them; and they may be present with either the first or second sound, or with both. The bellows sound resembles the puffing of a pair of bellows, and conveys the idea of smoothness. The saw and rasp sounds are so named from their similarity to the sounds occasioned by the sawing or rasping of wood, and convey the idea of roughness. But the bellows sound may insensibly pass into the others; and they all vary greatly in loudness. They may occupy the place of the first or the second of the heart's natural sounds, but more frequently that of the first than of the second. The saw and rasp sounds are generally louder, and present a wider range of intensity, than the bellows sound, which is more closely limited to the part which occasions it. They may all be heard in arteries at a distance from the heart, more particularly the bellows sound; and often when they do not exist in the region of the heart. When the saw-sound proceeds from the heart, it may generally be traced along the arch of the aorta to the subclavian and carotid arteries.

38. The causes of these sounds, and the exact site of the changes which produce them, are obviously the important considerations attached to them. They have been accounted for in various ways, even by their eminent discoverer; and, in general terms, they may be said to arise from unnatural or morbid motions induced in the current of blood circulating through the heart,

instead of those natural motions which contribute to the healthy sounds of the organ. Hence, whatever produces the morbid change of the motions of the fluid, will occasion the adventitious sounds; and we have reason to infer that such change is produced either by a permanent alteration of the apertures and canals through which the blood is propelled, or by a spasmodic or nervous state of the same parts.

39. The simple bellows sound is more common, and arises from slighter changes than the saw or rasp sounds, and is less to be depended upon in diagnosis. Pressure on an artery will occasion it; and when present in the heart, it will sometimes be removed by blood-letting. When even existing permanently, although it is a very strong indication of organic change in the heart, it cannot be implicitly relied on; but when only occasionally present, although such change may be its cause, yet it deserves no reliance. The saw or rasp sounds are much less frequent than the other; are much more constantly found in connection with contracted orifices of the heart; and are very frequently indications of an increased degree of the same cause that produces the bellows sound. It may, however, be generally inferred, 1st, That these sounds arise from some change in the orifices of the heart's cavities, ~~either~~ ^{or} by nervous or temporary causes, or by a ~~change~~ ^{change} of structure; more frequently the latter. 2d, That these sounds, therefore, although they indicate the existence of organic disease, are not ~~proof~~ ^{proof} of its existence of it, as they sometimes arise from other causes. 3d, That in proportion as these sounds possess more of the rasping character, the greater is the probability of organic change. 4th, If the sounds disappear after depletions, upon repose, or without sufficient reason, their dependence upon functional disturbance may be inferred, although not implicitly relied on; their continued absence, however, strengthening the conclusion. 5th, The continuance of these sounds, notwithstanding the means now mentioned, or their diminution merely, is nearly conclusive of organic change. 6th, Intensity of the sounds is no indication of the degree of valvular disease, or extent of the contraction of an orifice; as they may be weak, when these organic changes are extreme. A moderate contraction and size of current seem to be requisite to their full production. The relation of these sounds to the particular changes which occasion them is considered in connection with these changes. (See HUNT—Diseases of.)

40. The rasp and saw sounds are often accompanied with a phenomenon resembling a species of impulse, and which can be estimated by the sense of touch only. This is the *thrill* or *purring tremor*, termed "*bruissement*" by CORVISART, and "*frémissement cataire*" by LAENNEC, which is felt when the fingers are placed upon the heart, or on an artery. When existing in the heart, the feeling excited upon applying the hand to the region of this organ, is analogous to the sensation occasioned by the saw or rasp sounds. The fact is, that the same pathological condition gives rise merely to modified sensations as perceived by the medium of different organs, the object exciting the sensations being one and the same; the only difference being, that a stronger current is required to produce the pur-

ring tremor, than is necessary to the production of the sounds. It is owing to this circumstance that it is strongest in hypertrophy of the ventricle, or when the circulation is hurried. A firm pressure of the hand on the region of the heart is necessary to feel it well; and a moderate pressure to feel it in the arteries.

41. The last adventitious sound that I have to notice is that which LAENNÉC has termed the "*cri du cuir*," and which resembles the creaking of the leather of a new saddle. It seems to be chiefly observed in cases of pericarditis, when the opposing surfaces of the pericardium lose their lubricity, and when they are rendered rough by the exudation of coagulable albumen, or are in an unusual state of dryness; and to be occasioned either by their friction whilst in this state, or by the motions produced in that part of the pericardium reflected over the heart during the systoles and diastoles of the ventricles.

It is unnecessary to add any thing at this place, to what has been said respecting the auscultatory signs in diseases of the arteries, and particularly of the *aorta*. The employment of *auscultation of the abdomen*, in order to ascertain the existence of pregnancy, is comprised in the article *PREGNANCY*.

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BARBIERS.

CLASSIF. 4. *Class*, Nervous Diseases; 3. *Order*, Affecting the Muscles (*Good*). I. **CLASS**, IV. **ORDER** (*Author*).

1. **DEFIN.** Tremor, with pricking, formicating pain; numbness of the extremities, principally of the lower, followed by contractions and paralysis of the limbs, inarticulation or hoarseness of voice, emaciation, and sinking of all the vital powers.

2. This disease has been described by various authors since the appearance of the work of BONTIUS. But we have had no satisfactory account of it until Mr. MARSHALL furnished it in his interesting work on the diseases of Ceylon, and distinguished it from *Beriberi*, with which it had been confounded by BONTIUS, and recently by Dr. GOOD. Dr. J. CLARK had, however, noticed it briefly as a distinct disease, many years previously; and the definitions of it given by SAUVAGES, LINNÆUS, SAGAR, and AILIN, seem to indicate that they were not altogether unacquainted with its nature. I shall here follow the accounts of it by Dr. CLARK and Mr. MARSHALL, as they seem to be the most precise, and to have been the result of much experience.

3. SYMPTOMS.—The disease generally commences with a formicative pricking pain in the muscles of the lower extremities, with numbness, tremors, and an imperfect command of the powers of locomotion. Both lower limbs are always equally affected. In some cases the forearms

and hands, and the powers of articulation, are subsequently similarly seized. As the disease advances, the patient is unable to walk steadily. Standing or walking aggravates the uneasiness of the limbs, and either is impossible without support. The superior extremities become incapable of performing their usual offices; and want of sound sleep, great sluggishness, and inactivity, are complained of. The limbs afterwards are deprived of all feeling, and lose their natural temperature; the extensor muscles become quite paralytic, and the limbs contracted. Loss of appetite, indigestion, emaciation, &c. soon follow; and the pulse gradually sinks to a frequent, thready, or fluttering state; all the vital powers become depressed, and death supervenes. As respects its *duration*, it may be protracted for many months, and it may present various grades of severity. Its forms are frequently more mild, the above description applying to the *worse* cases. The *dysphasia* of barbers is described in the article *BERIBER*, with which disease it has often been confounded.

4. Mr. MARSHALL observed many cases of this disease, in 1812, amongst the Caffres composing the 4th Ceylon Regiment. He never noticed it amongst the indigenous inhabitants of this island; and, from every information he could collect, it was only known amongst Africans who had arrived in the island; and he believed that late comers were more disposed to it than acclimated residents. Mr. MARSHALL also met with it in Europeans in Ceylon: and he has observed an analogous affection in horses and dogs; from which, however, he never knew them to recover.

5. Dr. LIND states that barbers is a species of palsy frequent in India, affecting chiefly the lower classes of Europeans, who frequently sleep when intoxicated, in the open air, exposed to the land winds; and that its attack is sudden, depriving the limbs of motion, &c. It appears also to prevail in Java. Dr. BOSTON has described a case which seems to be nearly allied to this affection: and I have, for several years, been occasionally consulted by a patient, whose complaints are very nearly the same as those now described; and who had been previously seen by several medical men, and by some since he was under my care.

6. The REMOTE CAUSES of this affection are cold and moisture applied to the body; intoxication, irregularities, and excesses consequent upon inebriety; violent exercise in the sun; lying down in the open air during the heat of the day; exposure to the cold chilling dews of the night, or sleeping when thus exposed; suddenly obstructed perspiration, by currents of air; long fasting, and whatever exhausts the energies of life. The translator of BONRIUS's work states that babbiers is frequent on the Malabar coast, where it attacks those who unwarily sleep exposed to the land winds, particularly in the months of January, February, and March; and that it is seldom cured till after the shifting of the monsoon, unless the patient changes the climate.

7. **TREATMENT.**—This affection appears to originate in depressing and debilitating causes; to be characterised by a gradual and chronic sinking of the nervous energy; and therefore to require

a tonic, restorative, and stimulating treatment. Frictions, with stimulating liniments along the course of the spine, and on the limbs; attention to the due performance of the secreting and excreting functions; tonics, combined with warm cardiacs, gentle aperients, and antispasmodics; vesication; stinging with nettles; electricity; the internal use of the extract of nux vomica, or of strychnine; the application of external warmth, and the use of warm clothing; a nourishing and digestible diet; regular habits, and change to a healthy air or locality; are the chief means of cure. Dr. JOHN CLARK states, that the few Europeans whom he saw ill with this disease were cured by a change of climate, and a sea voyage. In other respects, the treatment is the same as that recommended in the article Palsy, particularly palsy from lead. (See COLIC—from Lead, and PALSY.)

1848, 1850, AND REFER. — *Bontius*, De Medicina Indorum, c. 1. — *Lund*, On the Diseases incident to Europeans in Hot Countries, &c. 4th ed. Lond. 1788. — *Clark*, On the Diseases which prevail in long Voyages to Hot Countries, and on those in the East Indies, &c. vol. i. p. 193. Lond. 1792, 8vo. — *Marshall*, Notes on the Medical Topography of Ceylon, &c. 8vo. 1822, p. 161. — *Bustock*, Trans. of the Med. and Chirurg. Society, vol. ix. art. i. p. 1. — *Good*, Study of Medicine, vol. iv. p. 493.

BERIBERI. SYN. *Beriberia*, *Synclonus Beriberia*, *Good*. *Hydrops Asthmaticus*, *Rogers*. CLASSIF. 4. *Class*, Diseases of the Nervous Function; 3. *Order*, Affecting the Muscles (*Good*). I. *CLASS*, V. *ORDER* (*Author*).

1. **DEFIN.** Oppressed breathing; paralytic weakness, numbness, and stiffness of the lower extremities; general oedema, with a swollen and bloated countenance.

2. **SYMPTOMS.**—The attack is in some cases gradual; in others sudden and severe. When it is the former, which is more commonly the case, the patient complains for several days of weakness, and inability or unwillingness to exert himself. To these feelings, pain, numbness, and stiffness of the lower extremities, accompanied with oedema; muscular weakness, and dyspnoea, particularly upon motion; a feeling of numbness, fulness, oppression, and weight at the scrobiculus cordis; extension of the oedema over the body, and leucophlegmatic tumescence of the countenance, supervene. As the disease advances, the dyspnoea increases, and the face is more swollen and bloated. The lips, which were at first pale, become bluish and livid; and the lower extremities more numb and feeble, or even paralytic. The stomach is often irritable, especially in the advanced stages of the disease, when it often rejects all ingesta; the bowels constipated; the urine scanty, high-coloured, and sometimes almost suppressed: the pulse is at first either more or less quick, small, and hard, or but little affected; subsequently irregular or intermittent; and the dyspnoea at last becomes distressing and attended with great anxiety, and sometimes with a peculiar fluttering about the heart, and sinking or leipothymia, succeeded by palpitations. In the more advanced stages of the disease the patient cannot lie down; his sleep is uneasy, interrupted, and always unsound; and the recumbent posture induces violent palpitations, sense of suffocation, and anxiety. The oppression at the præcordia and weight at the scrobiculus cordis increase, and are attended with spasms of the

muscles of the thorax and abdomen; the countenance becomes livid, and the extremities cold; vomiting is either frequent or nearly incessant; the pulse sinks, and the patient dies nearly in a state of suffocation.

3. In this, the most common form of the disease, it usually runs its course in about three weeks or a month; but sometimes, in slighter cases, the patient experiences several relapses, and is at last carried off unexpectedly, when the anasarcous symptoms have nearly disappeared, and he has been judged convalescent. In some of the milder attacks, several of the above symptoms are extremely slight, and the disease is altogether of much longer duration, or consists apparently of several distinct seizures. Such seem to have been the form of the majority of cases which Mr. MARSHALL has given in his work. In the most sudden and severe attacks, however, the pain, numbness, stiffness, and oedema of the lower extremities; the dyspnoea and anxiety, and all the more urgent symptoms, are either present from nearly the commencement, or they rapidly supervene on each other, and the patient dies in a few hours, or in a day or two. Such cases appear to be not so frequent as those which are more mild.

4. **REMOTE CAUSES.**—This disease is nearly peculiar to India and is most prevalent in various part of Ceylon, Malabar coast, and in that tract of coast which extends from Madras to Ganjam; being, according to Mr. HAMILTON, confined to these parts, and extending no further inland than fifty miles. It is most prevalent during the decline of one monsoon and the setting in of another, when the air is damp, cold, and loaded with vapours, and the vicissitudes of temperature greatest. Captain PRINCEPAT, in his "History of Ceylon," ascribes it to low diet and bad water, and partly to the dampness of the climate. Mr. RIDLEY, however, states that the worst cases he had of it at Trincomalee, where it was remarkably prevalent, occurred during the change from wet to dry weather, when a strong and hot land wind prevailed; and that its severest prevalence at Pulitoopané was during dry weather. In the Indian peninsula it seldom extends further inland than sixty miles; but in Ceylon, particularly at Kandy, it has prevailed under very different circumstances, as respects season, states of atmosphere, and topography. It seems to have been much more prevalent in particular districts, where it may be said to be endemic, in one year than in another; and to have assumed, at distant periods, a nearly epidemic form. Dr. CHRISTIE states, that a residence of several months in the district where it prevails is necessary to its production; and Dr. ROGERS never observed it in any person who had not resided six months or upwards in Ceylon. Dr. HUNTER has met with it also in Indian seamen, particularly Lascars, after exposure to a moist and variable atmosphere and privations of food.

5. Opinions respecting both the remote and proximate causes of the disease differ very materially among those who have had opportunities of observing it. Mr. DICK found it most prevalent amongst soldiers who had taken much mercury for venereal complaints, and who were addicted to spirituous liquors. He never met with it in the officers. Mr. RIDLEY, on the other hand, states,

that, in 1804, "both officers and privates fell victims to it." Drs. CHRISTIE and ROGERS view it as a consequence of deficient and poor diet, impure and moist air, and of prolonged exposure to marsh exhalations; and consequently as a disease of debility,—an opinion which is in accordance with that of Mr. DICK and Mr. RIDLEY. Mr. COLQUHOUN found it to prevail notwithstanding prophylactic measures founded on these views; and Mr. MARSHALL did not observe it to occur amongst the troops in Ceylon, when exposed to the causes to which Drs. CHRISTIE and ROGERS impute it; and from that circumstance, as well as from the effects of medicines, thinks it a disease of increased vascular action; in which opinion Mr. HAMILTON agrees with him.

6. *Appearances on dissection.*—There is always a leucophlegmatic appearance of the surface, with oedematous effusion to a greater or less extent in the sub-cutaneous cellular tissue, and paleness of the muscles; sometimes with a watery obesity and deposition of fat in the abdominal regions. Occasionally there is fluid effused between the membranes of the brain and in the ventricles; with vascularity of the encephalon, and slight appearances of congestion in the spinal canal. Serum is always found effused in the pleural cavity, and very frequently in the pericardium. The lungs are gorged with dark blood, and their structure more or less oedematous. Cellular adhesions are sometimes found connecting the opposite surfaces of the pleura. The heart is generally soft, enlarged, and anæmic. The peritoneal sac often contains much serum; and the liver is always found engorged with dark blood, is unusually large, and of a very deep colour. The spleen is generally very soft, large, and is, as well as the large veins, loaded with black blood. Sometimes inflammatory appearances are observed in the diaphragm and serous surfaces; but these are only occasionally and very loosely noticed. (CHRISTIE, ROGERS, MARSHALL, and HAMILTON.)

7. *Nature of the disease.*—It is evident that the nature of this disease can be inferred only from what is known of its exciting causes, and the appearances presented after death. Of the former we have very imperfect, loose, and conflicting information: of the latter no precise and minute account. It is difficult to explain the early occurrence of the paralytic symptoms. The spinal chord, brain, and nerves supplying the lower extremities, have not been sufficiently investigated to warrant a positive opinion as to the particular state of these parts, to which these symptoms may be referred. They may, however, depend upon congestion of the veins and effusion of fluid within the spinal canal. The dyspnoea is evidently owing to congestion of the lungs, and oedema of their structure; and the feeble and irregular action of the heart may be imputed to the weakened vital energy and structure of the organ, in connection with effusion of serum in some cases into the pericardium. The effusion of fluid within the serous cavities may, like other effusions, depend upon very different states of the vessels and serous membranes. By Mr. MARSHALL and Mr. HAMILTON it has been viewed as the result of inflammatory action. But where there is merely an effusion of a limpid serum, without either albuminous flocculi or adhesions, there evidently can exist no actual inflammation. Viewing the

antecedent symptoms in relation to the post mortem appearances, as far as both have been described, it may be inferred that the disease is more dependent upon active congestion of the lungs, liver, and spinal chord, than upon any of the usual states of inflammatory action; and that this congestion is intimately connected with weakened power of the nervous and circulating systems; manifested chiefly in the heart and extreme capillaries of the cellular and serous structures, with imperfect function of the liver and lungs, and with effusion of serum to a greater or less extent into the shut cavities and cellular structures of the body; giving rise to a nearly universal acute dropsy, and complicated with more or less of paralysis of the lower extremities.

8. *DIAGNOSIS.*—The paralytic symptoms, constant dyspnoea, universal oedema, and leucophlegmatic interturbance of the countenance, characterise this disease sufficiently, and distinguish it from the *cachexia Africana*, with which it has been considered as being allied (see *CACHEXIA—Africana*). It has been, however, more commonly confounded with *barbiers*; but the history of both diseases show a very obvious difference between them. *Barbiers* is a very chronic disease, in which the paralytic symptoms, tremors, spasms, and contractions of the limbs, and emaciation, are the most remarkable symptoms; whilst the present malady is extremely acute, often of very short duration, and is characterised by general oedema, dyspnoea, the suddenness of its fatal termination, and the frequency of its occurrence. The former is, in fact, a species of *paralysis*; whilst the latter is a form of *acute dropsy*, very generally diffused throughout the body, and complicated with slight paralytic symptoms.

9. *TREATMENT.*—According to this view of the disease, the discordant accounts given of the success of treatment will be readily accounted for. When the disease prevailed very generally in the Carnatic, during 1782 and 1783, Mr. DICK, who appears to have treated a very great number of cases, found most advantage, during the former of these two seasons, from a pill, containing a quarter of a grain of extract of elaterium combined with extract of gentian, given every hour, until copious watery evacuations were procured; and this plan was repeated every third or fourth day, till a cure was accomplished. In the following season this treatment was not so successful. He found most advantage from large doses of spirit of nitre, antimonial wine, frictions with warm camphorated oil, aperient medicines, and wine to support the strength. Bleeding and mercury were tried without benefit. Dr. CHRISTIE recommended mercury, to excite ptyalism, combined with squills; cordial liquors, consisting chiefly of gin punch; stimulating pediluvia, with warm liniments; and when the patient was convalescent, tonics, composed of bark, wine, and porter. In more urgent cases, he prescribed blisters to the chest, and brandy, æther, and laudanum, to relieve the vomiting, dyspnoea, and spasms. He found digitalis of no service. Mr. HAMILTON's first cases terminated fatally under the plan recommended by Dr. CHRISTIE; and Mr. COLQUHOUN trusted to mercury, but found that many of the patients who

died in hospital of the disease were in a state of salivation from this medicine.

10. This want of success led later writers on the disease to have recourse to other means. Dr. HUNTER had tried blood-letting in one case, without any apparent effect either one way or another. Dr. ROGERS stated, in his thesis on the disease, that blood-letting hastened the fatal termination: but, according to Mr. HAMILTON, he has since prescribed it successfully. Mr. MARSHALL appears to have been the first to employ blood-letting in a decided and successful manner in the treatment of beriberi; and the same practice was adopted by Dr. PATERSON (MARSHALL, on *Ceylon*, &c. p. 161.), and by Mr. HAMILTON. The bleeding was large, and repeated; and followed with the internal and external use of mercury, laudanum, and the vapour bath. To these were added purgatives of calomel and cambooge.

11. The practice of Mr. RIDLEY, who experienced, himself, two very severe attacks; and who, excepting only Mr. DICK, has had the most extensive experience as respects this disease, having treated almost a hundred cases in one year (1814); recommends a nearly similar treatment to that advised by Mr. DICK. In the early stage, he directs purgatives of calomel, jalap, and crystals of tartar; the lower extremities to be well bathed, afterwards rubbed with camphor and oil of turpentine, or with the mercurial liniment, and then rolled in flannel bandages. He subsequently prescribes a pill, composed of one or two grains of calomel and two or three of powdered squills, every third hour; and a solution of crystals of tartar, as common drink, or made into punch with geneva or arrack. In the more advanced stages, he advises blisters to the back of the neck, or to the seat of pain and tightness; the warm-bath; frequent fomentations of the legs and abdomen, followed by frictions with mercurial ointment, camphor, and oil of turpentine; and clysters with æther, and purgatives. When the dyspnœa, spasms, and vomiting are urgent, he states, that he has given large doses of opium, æther, and brandy, with stimulating diuretics. When they could be retained on the stomach, small and repeated doses of cambooge were also exhibited.

12. From the above statements, as well as from the varying character of the disease in Europeans and natives, in different seasons, as observed by Mr. DICK, and in various localities;—judging also from the nature and combination of the remote causes, and from the *post mortem* appearances;—I should infer, that a depletory treatment may sometimes be required amongst Europeans; and that the means of cure should be modified according to the characters of the malady and the state of the vital energies; that, on some occasions, general blood-letting—in others, cupping in the course of the spine; blisters; free purging with calomel, cambooge, jalap, elaterium, &c.; antispasmodics, consisting of opium, æthers, brandy in some cases, camphor, &c.; diuretics, such as squills, cream of tartar, juniper, terebinthinate preparations, &c.; the vapour bath, or fomentations, followed by frictions with stimulating liniments, mercurial or camphorated liniments, with oil of turpentine, camphorated oils, along the spine and lower extremities; ex-

pectorants, consisting of ammoniacum, ipecacuanha, camphor, &c.; constitute the chief means that are likely to remove the internal congestions, to reduce the circulating fluid to a nearer equality with the vital power, to restrain effusion, and to restore the various secretions and excretions of the body. After these means have been judiciously administered according to the peculiarities of the case, or when circumstances seem to require it earlier in the treatment, stimulating and restorative medicines may either be conjoined with the above, or be exhibited on such occasions as may require them.

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BLOOD. SYN. *Alua*, Gr. *Sanguis*, Lat. *Sang*, Fr. *Dus Blut*, *Geblut*, Gt. *Sangue*, Ital.

CLASSIF. GENERAL PATHOLOGY.—*Ætiology*, *Semeiology*.—GENERAL THERAPEUTICS.

A. I. STATES OF THE BLOOD IN HEALTH.—1. A. Of the *serum* of the chyle. In order to acquire accurate ideas of the blood in disease, it is necessary to be acquainted with the varying conditions and appearances of the chyle, according to the form from which it is chiefly elaborated. To these, however, I only briefly refer. This fluid, when removed from the thoracic duct, is usually of an opaque white or opalescent appearance, and separates into a serous portion, and more or less firm clot. The former resembles the serum of the blood, the latter consists chiefly of fibrine. If the animal have been fed with fat animal food, the chyle at the time of coagulation assumes a rose colour, and, in addition to the separation of the clot, which falls to the bottom of the vessel, a thin liquid oily layer forms on the surface of the serum. In animals fed on vegetable food, the chyle is generally opaline and nearly transparent, and separates into a serous fluid and a small fibrinous clot only. According to MM. PREVOST and DUMAS the chyle contains globules, similar to those contained in the blood, but of a smaller size. The fibrinous coagulum seems to be formed from their aggregation. The serum of the chyle also contains albumen, and the saline ingredients found in the serum of the blood.

2. B. The globules of the blood, particularly in respect of their relation to the other constituents of this fluid, and the changes they experience when removed from the blood-vessels, excite the utmost interest in the mind of the pathologist. It is evident that they are suspended in the serum by means of the vital influence which the blood derives from the vessels and organs in which it circulates. According to the microscopic researches of Sir E. HOME, Mr. BAUER, and of MM. PREVOST and DUMAS they consist of a central colourless spheroid; and of a species of membranous sac of a red colour, surrounding this spheroid, from which it readily separates after death. The central bodies are transparent and spherical in the mammalia; and, when deprived of their coloured envelopes, are generally disposed

to assume ranges or fibrous meshes. The coloured portion appears to be a kind of jelly, easily divisible; but insoluble in water, from which it may be separated by repose. It is likewise transparent; but much less so than the central corpuscle: and the fragments arising from its division are not susceptible of regular aggregation.

3. *C. State of the blood in the vessels.* — According to the observations of KOLK, TREVIRANUS, and others, the globules of the blood possess a rotatory motion during life, independently of the motion arising from the impulse of the heart; and this motion continues till coagulation takes place. More recently, this subject has been investigated by Professor SCHULTZ, of Berlin, who has confirmed the fact respecting the intestine motion of the globules, by virtue of which they move on by themselves, surrounded by envelopes of colouring matter, and keeping at a distance from one another. This force, with which the globules of the blood are endowed whilst circulating in the vessels, I have, in my physiological notes, imputed to the influence exerted by the ganglial nerves on the interior of the vessels, which they every where so abundantly supply, as stated in the article on the pathology of the ARTERIES. But, besides this force of mutual repulsion, which the fluidity of the blood is evidently owing to, under the vital influence exerted by the organic nerves on the vessels, there is evidently another force also in action, by which the globules are attracted by the tissues, when they are brought more intimately in contact with them during their circulation in the minute vessels. Whilst, then, the former force keeps the globules in a state of constant motion and repulsion, and is exerted in the stream of the circulation, the latter tends to bring the globules to a state of repose, and is exerted in the organic structures themselves, at the point of contact of the solids and the globules. This latter force, which was first very minutely examined by Professor SCHULTZ, and briefly stated by M. ANDRAL, in his Pathological Anatomy, without acknowledgment, may be compared to a vortex, whence globules constantly pass from the arterial or terminal capillaries, and are lost in the different tissues. So that, although the vital endowment of the blood is manifested by its fluidity in the vessels, it assumes an opposite manifestation in the capillaries, where this fluid is brought within the sphere of the vitality of the different structures; each one attracting from it those constituents of which itself is formed, and which are always present in healthy blood.

4. Thus we see organisation commencing in the chyle, advancing further in the blood, and reaching its acme in the vital attraction of the constituents of the tissues from the blood circulating in the capillaries which supply them. At this part of the circle, where the arterial capillaries, with the fluid circulating through them, become, as it were, confounded with the tissues in which they are distributed, there appears, according to Professor SCHULTZ, to be not only a constant attraction of particles by the tissues from the blood, but also an equal extrication of other particles from them into the blood received by the radicles of the veins. Thus it appears, that as the proximate constituents of the different tissues exist in the blood, as was first shown by Dr.

PROUT, and subsequently insisted on by MAJENDIE and ANDRAL; and as these become identified for a time with them, are afterwards detached, and flow back into the current of the circulation; the intimate connection and mutual dependence of the blood and the different solids, both in health and disease, ought not to be overlooked. But it is at the same time manifest that these constituents are kept in solution during circulation, and attracted during nutrition, by the vital influence; that the various parts into which the blood separates on removal from the vessels are only indications of its condition when circulating through the frame; that no such separation occurs in the healthy body, and never, excepting very partially, in disease; that this change proceeds from the loss of vitality sustained by the blood when removed from the frame, and that the phenomena connected with it have an intimate relation to the vital endowment of this fluid derived from the vessels and the nerves supplying them.

5. *D. Coagulation of the blood.* — This process is modified by numerous circumstances, and by various diseases. Generally, however, the blood soon separates into two portions — the serum, and the coagulum or clot; and in this separation the globules are principally concerned; it being chiefly the result of the loss of the vital motion which these globules possess in the vessels, and of the attraction existing between the colouring envelopes and central bodies. As the vital attraction, which keeps the red substance fixed around the whitish corpuscles, ceases soon after the removal of the blood from the vein, these bodies can then obey the force which tends to unite them, and they then form a net-work, in whose meshes the liberated red particles are entangled, and thus produce the phenomena of coagulation. If the coagulum be exposed to a stream of water, the colouring matter is washed away, while the aggregates formed by the colourless corpuscles remain in the form of filaments, in which may be recognised an analogous structure to muscular fibre, and constitute the fibrine of the blood.

6. It seems extremely probable, that the colourless globules observed in the chyle form the central corpuscles, and, when they have acquired their coloured envelopes in the progress of sanguification, constitute the red globules. And it appears equally reasonable to infer that both the suspension of the globules in the serum, and the attraction between their coloured envelopes and colourless corpuscles, are entirely vital, inasmuch as both phenomena cease soon after the blood is removed from its source of vital endowment: and that vital manifestations become first apparent in the chyle, and still more so in the blood; coagulation being the result of the loss of this endowment, and taking place with a celerity in proportion to the rapidity of its departure. In cases where the vital energy, or that manifestation of it exerted by the organic nerves on the vascular system, is unexhausted, or is in a state of healthy excitement, coagulation is perfect and somewhat slow; but where it is depressed or exhausted, this process is quicker, but much less complete. Besides these, it presents various other phenomena, which are intimately connected with the nature of morbid actions, and which I shall notice immediately.

7. E. Chemical relations of the blood in health.

—The analysis of the blood given by M. LE CANU, who obtained the prize given by the Académie Royale de Médecine of Paris, is extremely minute; and, as respects the principal ingredients, agrees very closely with the results stated by BERZELIUS and MARCET. The only matter first detected in the blood by Dr. TRAIL, and subsequently found by Drs. CHRISTISOV and BABINGTON, has likewise been recognised by him as constantly present in the serum. The results of the analysis of the serum by LE CANU, BERZELIUS, and MARCET, are as follow:—

| | LE CANU. | | BERZ. | MAR. |
|--|-----------|----------|-------|---------|
| | 1st Anal. | 2d Anal. | | |
| Water | 906.00 | 901.00 | 905 | 900.00 |
| Albumen | 78.00 | 81.20 | 80 | 86.80 |
| Animal matter sol. in water and alc. | 1.69 | 2.05 | — | — |
| Animal matter sol. with soda | 2.10 | — | — | — |
| Crystallisable fatty matter | 1.20 | 2.10 | — | — |
| Only matter | 1.00 | 1.30 | — | — |
| Muco-extractive mat. | — | — | — | 4.00 |
| Extractive mat. sol. in alc. and acetate of soda | — | — | 4 | — |
| Hydrochlorate of soda and potash | 6.00 | 5.32 | 6 | 6.81 |
| Sub-carb. and phosph. of soda and sulph. potass | 2.10 | 2.00 | 3 | 2.00 |
| Phosph. of lime, magn. and iron, with sub-carb. of lime and mag. | 0.91 | 0.87 | — | 0.60 |
| Loss | 1.00 | 1.61 | 1 | — |
| | 1000.00 | 1000.00 | 1000 | 1000.00 |

8. The blood, according to M. LE CANU, consists of the following constituents:—

| | | |
|---|----------|----------|
| Water | 780.145 | 786.590 |
| Fibrine | 2.100 | 3.563 |
| Albumen | 65.089 | 69.415 |
| Colouring matter | 133.000 | 119.626 |
| Crystallisable fatty matter | 2.130 | 4.300 |
| Only matter | 1.310 | 2.270 |
| Extractive mat. soluble in alcohol and water | 1.790 | 1.920 |
| Albumen combined with soda | 1.265 | 2.010 |
| Chloruret of sodium and potassium, alkaline phosphate, sulphate, and subcarbonates | 8.370 | 7.304 |
| Subcarbonate of lime and magnesia, phosphates of lime, magnesia, and iron, peroxide of iron | 2.100 | 1.414 |
| Loss | 2.400 | 2.585 |
| | 1000.000 | 1000.000 |

According to some chemists the blood also contains carbonic acid (VOGEL and others); a yellow colouring matter, resembling that of the bile and the urine (CHEVREUL, LASSAIGNE, &c.); and a substance analogous to urea (PREVOST, DUMAS, VAUQUELIN, and SEGALAS). VAUQUELIN and CHEVREUL consider the fatty matter to be similar to that of the brain and nerves.

9. a. The quantity of water in the blood of a healthy person varies, according to M. LE CANU, in 1000 parts, from 853.125, the maximum, to 778.625, the minimum. He found the medium quantity in males to be 791.944, and of females 821.764. The quantity also appears to vary with the temperament; as the lymphatic temperament in the male furnished 830.566, of the female 803.716; and the sanguineous in the male 786.584, in the female 793.007.

10. b. The albumen contained in 1000 parts of

* Probably the same constituents, differently named, and more minutely examined, by M. LE CANU.

blood varies from 78.270, the maximum, to 57.690, the minimum. It is nearly the same in the male as in the female, being only about one part more in the former. The difference in the quantity appears to have no relation to the temperament, nor to the age of the subject, from twenty to sixty years.

11. c. The quantity of fibrine contained in the coagulum varies extremely. According to BERZELIUS it is only .75 for 1000 of the blood. M. LASSAIGNE states, that the fibrine of the blood of a young vigorous man is only $\frac{17}{1000}$ of its weight. In the researches of M. LE CANU, who has investigated the subject more closely than his predecessors, the quantity of dry fibrine contained in 1000 parts of blood varies from 1.360 to 7.236—the medium of twenty-two experiments being 4.298. It appeared to be greatest in the young or middle-aged of the sanguine temperament, and in the inflammatory state; and least in the lymphatic constitution, the aged, and those suffering under congestion or hæmorrhage.

12. d. The proportion of globules varies much more remarkably in the blood of a healthy person, than that of the albumen; the maximum being 148.450, the minimum 68.349, and the medium 108.399, in 1000 parts of blood. The average quantity in males was 132.150, and in females 126.69. The periods of life intervening between twenty and thirty years had no influence on its quantity; but it was found to vary with the temperament. The medium quantity in the lymphatic temperament was 117.300, among females, and 116.067 among males, and in the sanguineous temperament, 126.174 in females, and 136.497 in males; giving 19.830 more globules to the sanguine temperament in 1000 parts of blood. M. LE CANU found the globules of blood greatly diminished in female subject to a copious flow of the menses. The quantity of globules is also, relatively to the other constituents of the blood, greatly diminished by blood-letting, whilst the albumen is not sensibly affected. Thus, a first bleeding furnished in 1000 parts of blood 792.897 of water, 70.210 of albumen, 9.163 soluble salts and animal extractive matters, and 127.73 of globules; but a third bleeding a few days afterwards in the same patient (a female), gave 834.053 of water, 71.111 of albumen, 7.329 of soluble salts and extractive matters, and 87.510 of globules.

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II. EXUBERANCE OF BLOOD, Plethora (πληθώρα, reptation). SYN. Polyæmia (Auct. Var.). Hyperæmia, pléthore, Fr. Die Vollblütigkeit, Germ. Pletora, Ital. Excessive Fullness of Blood.

CLASSIF. PATHOLOGY—*Etiology*. IV. CLASS, II. ORDER (Author, see *Classif.* in *Pre-face*).

13. *DEFIN.* Greater fulness of the vascular system than is compatible with the continuance of health; or repletion of this system.

14. The importance of attending to the varying states of the circulating system, in respect of both *exuberance* and *deficiency* of the fluid contained in it, has been acknowledged since the time of GALEN. After the doctrine of nervous influence had superseded the humoral pathology, the state of the blood in disease experienced a more general neglect, than the part actually performed by this fluid in the causation and perpetuation of morbid actions ought to have procured for it. Yet have there always been a succession of able observers and writers, who have never lost sight of the influence of the *quantity* as well as *quality* of the blood in producing, as well as in modifying, disease; and more recently the subject has deservedly received an increased and an increasing attention. *Plethora* is the opposite of *anæmia*: both may be, to a certain extent, compatible with health; but both predispose more or less to disorder, and, beyond certain limits, constitute distinct and opposite states of disease.

15. *A. General plethora.* — GALEN, BAILLOU, FERNEL, RIVIÈRE, and others, considered plethora to be of two kinds; to which subsequent writers added two more. As these distinctions are still, in several respects, founded in truth, notwithstanding the neglect to which they had long fallen, I will here briefly notice them. 1st, True or absolute plethora — *plethora ad rasm*; 2d, Apparent — *plethora ad volumen*; 3d, Plethora relative to space — *plethora ad spatium*; 4th, Plethora in relation to vital power — *plethora ad vires*. It will be observed that the first and second of these, the species recognised by the earliest writers, are still upon the whole the most important. In the *first*, the blood is permanently increased beyond the wants of the system. In the *second*, plethora is merely a passing occurrence, arising from temporary causes, as the general turgescence occasioned by sudden or high ranges of temperature, &c. In the *third*, the blood may not be increased, but its relative quantity may be too great, as is observed after amputations of one or two limbs. In the *fourth*, the quantity may not be too great, if this fluid were actuated by a healthy state of the vital energy; but it may be excessive in respect of the influence by which it is circulated in all parts of the body. Now, those distinctions are actually founded in nature; and although they may all be resolved into one pathological proposition, viz. greater repletion of the vascular system than the wants and conditions of the economy require, still they must have become matters of experience to every one whose range of observation has been such as entitle his opinions to respect. I shall merely remark upon such of them as admit of dispute.

16. False plethora is very generally observed to occur in persons suddenly exposed to elevations of temperature, and depends more upon the effect of heat in exciting the vital turgescence of the capillary vessels, whereby a craving for fluid is created, and a larger quantity is absorbed, than upon the expansion of the fluids themselves, owing to the increase of temperature. A state of false plethora is very frequently occasioned, — and is often productive of more serious consequences than have generally been imputed to it, — by in-

gurgitation and increased temperature conjoined; and it should not be overlooked, that these combined influences not infrequently affect those who are already permanently plethoric. This will be more forcibly and truly shown by what must have fallen under the observation of many. A red faced, full veined, and robust looking person, of from forty to sixty, sits down to dinner with a good appetite. He eats three times as much as his body requires, and he excites the stomach to digest it by drinking stimulating fluids to six times the quantity that is necessary. All this, moreover, is done in a close and overheated apartment. The vital turgescence and expansibility of the capillaries and veins are excited to the utmost; the whole surface is full and plump, and the extremities even swollen. Now, a person thus circumstanced, particularly from four to eight or more hours after such ingurgitation, actually has the quantity of his circulating fluids increased from one sixth to one third, at a moderate calculation: but the increase is generally soon diminished by the pulmonary exhalation; the urinary, the perspiratory, and intestinal secretions; which are all greatly augmented, and are thus the safety valves of the circulation. But how often, notwithstanding, do we observe the vessels at last yield before the mass which distends or overloads them, and apoplexy, and various other hæmorrhages and congestions, result; particularly when any one of these safety valves are obstructed or tardy in their action — when the nervous or vital influence is either depressed or much exhausted by the previous excitement, and the vessels are irritated, or their actions otherwise changed by the state of their contents.

17. That plethora is a not infrequent result of amputations cannot be disputed, although the privation of sufficient exercise, which is thereby occasioned, will partly account for the occurrence; at the same time we generally observe that the same quantity of food is taken, and the same quantity of blood is prepared for the body, when deprived of one fourth part of the structures requiring support, as was provided for its nourishment when it was in a state of integrity.

18. That plethora may exist in conjunction with deficient vital or nervous power, and that, although the quantity of blood in the system may not exceed that of health, and yet be too great for this power to control, cannot be doubted. We are constantly observing such pathological conditions, both at the commencement and in the progress of disease; and frequently remark their influence in its advanced states and terminations. (See article CONGESTION.)

19. The causes of plethora are so manifest as scarcely to require enumeration. They may operate either singly or in conjunction. They consist, 1st, Of the introduction into the vascular system of a greater quantity of the nutritious elements than is necessary to the support of the organisation; and, 2d, Of the retention in the blood of those parts which are usually removed by the secreting and excreting organs. It must be evident that the former is owing to excess of nourishment and stimulating fluids; whilst the latter proceeds most commonly from insufficient exercise, suppressed natural secretions and excretions, or accustomed morbid discharges. How remarkably the habits, indulgences, luxuries, and

refinement of modern life contribute to these, is sufficiently apparent. At the same time it should not be overlooked that there are certain constitutions, and particularly those of a lax fibre, more disposed to plethora than others, even independently of temperament; that this disposition is often hereditary; and that it is frequently so strong, notwithstanding precautions to overcome it, as to constitute a distinct diathesis. Plethora, particularly in conjunction with a rich state of the blood, is generally most remarkable in those who live highly, drink much, and are very often out in the open air, without taking active exercise.

20. There are also certain epochs of life at which it is most apt to occur, particularly when the energies of life are beginning to wane, and when the balance between sanguification and secretion preponderates in favour of the former. (See article AGE.) Plethora is also more frequent in females than in males, owing to their more sedentary occupations, and to the wants of the female economy, particularly during the period of utero-gestation, and subsequently to the cessation of the menses. It is justly remarked by various writers, that the plethora of early life is generally arterial and capillary; that of advanced age altogether venous.

21. Plethora has been too generally considered as always existing in fat persons, and as occurring at least in them most commonly. But obesity is no sure criterion of plethora; it may even co-exist with a deficiency of blood. I have known the supposition, that obesity indicated at least a sufficiency of this fluid, lead to dangerous results. Indeed, the opinion is entertained by several of the older writers, that fat persons do not bear depletion, is quite as well founded as its opposite. There are other circumstances besides this which must be taken into consideration, when we estimate either the simple existence of plethora or its extent. This state of the vascular system is sometimes associated with leanness; but when this is the case, the pulse is also full and strong, and the veins very large, full, and rapidly filled upon being emptied by friction. It is more generally observed in persons passing middle age, who, with a ruddy, flesh-like, or lively surface, are beginning to assume greater fulness of the frame without loss of firmness; and in whom the pulse is full and the veins well marked.

22. *Symptoms.* — Plethora, in its slightest grades, is generally productive of little inconvenience. There are usually observed merely a greater disposition to sleep than in health; less quickness and aptitude to mental or corporeal exertion; and a more marked disposition to suffer from and to be affected by the more energetic causes of disease. In an advanced degree it occasions lassitude, indolence, vertigo, or weight or pain of the head; heavy, snoring, dreamy, and often unrefreshing sleep; turgescence of the countenance, suffusion of the eyes; fulness of the veins, and of the pulse; occasionally palpitations of the heart, and slight amaurosis. Such are the usual signs of plethora, short of actual disease, at least of such as may alarm the patient. When it proceeds further, it assumes either the features of inflammatory fever, with excess of action in some organ or part, or passes into general visceral congestion, according to the states of vital action

and power. It may moreover occasion, or terminate in, hæmorrhage, visceral inflammations, congestions, and obstructions, active dropsy, morbidly increased secretions, convulsions, spasmodic diseases, morbid states of the vessels, &c.

23. *B. Local plethora.* — The vessels of an organ or part may be loaded with blood, and yet the state of their vital action may be neither generally or locally exalted to the pitch of active determination, nor reduced so low as that of passive congestion. There are, perhaps, few such cases that are entirely independent of some degree of excitement, arising either from the condition of the nerves of the organ, or from an irritating cause of some description influencing the state of the capillaries. The best exemplifications of this state are the plethoric states of the ovary and uterus previous to the menstrual discharge; of the generative organs during the venereal orgasm; of secreting glands and parts when their functions are unusually active; of the brain during the exciting passions and emotions (see *Local determinations of Blood*), and various internal viscera, particularly the spleen, during the cold stage of an ague, &c. These last, however, more nearly approach to congestion than to simple local plethora. It should not be overlooked, that what excites the nerves and irritates the tissues of a part, will in proportion turgescence of the capillaries, increased flux of blood into the arteries supplying them, and a quick return of this fluid through the veins. If these parts thus excited perform secreting functions, these will be augmented; and thus increased flux and local plethora will both exist, and constitute local determination of blood, — a state which will be considered hereafter. But still this is not inflammation; for as soon as the cause of excitement ceases, this state disappears, without terminating in any of the ways in which inflammatory action terminates, and without having assumed any part of the formative process which in some state or other follows upon inflammation occurring in a previously sound frame. It cannot, however, be denied, that although local plethora does not constitute either inflammation or passive congestion, it will often favour the production, not only of these, but also of hæmorrhages, convulsions, &c., according to its seat and extent, the state of vital power, the nature of the exciting causes, and other contingent circumstances. It is evident that local plethora may occur either with or without general plethora. It may even coexist with insufficiency of blood (§34.).

24. *C. The treatment* of general and local plethora consists almost entirely of avoiding its causes. Simple plethora does not require, and is seldom permanently benefited by, vascular depletion alone; indeed, it is more generally increased after a time by this practice, unless more efficient measures be also employed. Abstinence, and a free state of the secretions and excretions; active and regular exercise; abridging the period of repose; early rising; a moderate use of diluents, and abstaining entirely from malt and spirituous liquors; cooling and acidulous beverages, when thirst requires to be quenched; are the chief means both of prevention and cure.

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Juncker's ed. Halm, 1737. pp. 303. 483, &c.; et De Plethora. Erf. 1736. — Juncker, *Conspicius Medicinæ*. Halm, 1736, p. 7. et seq. — Nicolai, *De Singulari quibusd. ad Polyæmiæ Spectantibus*. Jene, 1790. — Rudolstetter, *De Morb. ex Abundantia Sanguinis oriundis*. Helms. 1777. — Weickard, *Vermischte Schriften*, b. iii. p. 89. — Gregory, *Conspicius Med. Theoret.* ed. vi. p. 152. — Horn, *Beiträge zur Medic. Klinik*, vol. ii. p. 88. — Calemard Lafayette, *Essai sur la Plethore ou Polyémie*, 4to. Paris, 1809. — Faidy, *Diet. des Sciences Méd.* t. xliii. p. 178. — Parry, *Mémoires de Pathologie*, 2d ed. p. 30. ap. — Rochoux, *Diet. de Méd.* t. xvii. p. 123.

III. LOCAL DETERMINATION OF BLOOD.

SYN. Afflux of Blood; increased Momentum of Blood. Fluxion, Fr.

CLASSIF. PATHOLOGY. THERAPEUTICS — (Derivation, Revulsion).

25. *The determination of a larger proportion of the circulating fluid to an organ or part, than is usually sent to it in health, not infrequently takes place independently of inflammation.* This state of the local circulation has been, singularly enough, doubted by some writers, and too much insisted on by others, more particularly by Dr. PARRY, who assigned to it a greater importance in pathology than it is entitled to, and overlooked the fact that it is a part only or link in the chain of morbid causation.

26. I. *PATHOLOGICAL DOCTRINE. — Determination of blood is intermediate between inflammation and local plethora. Inflammation is an actively morbid state of the capillaries, in which a passive condition of both the arteries and veins; whilst determination is a simply active excitement, but not otherwise diseased, state of both the arterial branches and the veins, the veins being unaffected, and readily returning the blood conveyed by the arteries. More or less determination of this fluid accompanies acute and sub-acute inflammations, and hæmorrhages; but it never attends congestion, unless this state pass into either of the former diseases, or be followed by augmented secretion from the congested organ. Local plethora (§ 23.) is a lower grade of local determination, or rather an intermediate state of the vascular system between determination of blood and congestion. In other words, (a), *Congestion* of blood is repletion of the veins, attended by depressed vital power — (b) *Local plethora*, increased fulness of the vessels generally, with integrity of vital power — (c) *Local determination*, augmented circulation and vital functions of the vessels — and (d) *Inflammation*, an actively morbid state of the vessels, and organic nerves supplying them, tending to change of structure and to disorganisation. As these pathological states are often referred to, and are sometimes improperly confounded, it is therefore necessary to attend to the distinctions now drawn.*

27. That determinations of blood actually occur, and may even be excited at pleasure for a short time, are matters of daily observation even in health; and that such changes in the circulation of a part are occasioned by the influence of the nerves, particularly of the organic nerves supplying the vessels, seems an equally well established fact. When these nerves are excited, whether by heat, stimuli, friction, or irritating bodies, the capillaries experience a degree of expansion, — a property with which they are naturally, or rather vitally endowed. The erythism, or slight erection, which is evinced by the capillaries of certain organs in a very remarkable manner, exists more or less throughout

the frame, especially in mucous or cellular parts. When, therefore, this property is influenced by any agent possessed of the power, the diameter of the capillaries running between the arteries and commencement of the veins being increased, an enlarged stream of blood will necessarily pass through them, and a correspondent demand will be made upon the arteries supplying them, owing to the less resistance opposed to the current, and freer circulation in the part thus circumstanced, provided that the return of blood by the veins be not impeded. If the circulation be thus increased as respects the volume of blood passing through the vessels, and continue thus facilitated, the demand thereby made upon the larger vessels and the heart will ultimately tend also to accelerate it; and hence will result augmented volume and quickened circulation — the states constituting determinations of blood.

28. The circulation of an organ or part may long remain in this state, particularly if its vital manifestations do not become exhausted, and if its nervous power continue excited by the agent or cause which first occasioned this condition, or by other influences operating in a similar manner. But if the vital or nervous power become depressed, or otherwise changed, either congestion, or some form of inflammation, will generally ensue, or even hæmorrhage may take place, — a result which is not infrequent when the determination takes place to membranous viscera or parts, and to mucous surfaces. These being, therefore, not unusual terminations of simple determination of blood, means should generally be employed to remedy this state. The agent or cause exciting the vessels should be removed, and other measures directed that may equalise the circulation and diminish its fulness, when the determination is connected with plethora, as it not infrequently is.

29. Determinations of blood to an organ are very frequently occasioned by whatever rouses its natural actions. If the part thus excited perform secreting functions, the increased secretion, in addition to whatever excitement of the vessels may be produced, will of itself determine a greater flow of blood to it. Numerous proofs of this are furnished us by the progress of various diseases, and the appearances presented by others after death; and, endeavouring to follow nature, we attempt to remove determination or inflammations in vital organs, by inducing artificially an afflux of blood to parts and surfaces where it cannot be injurious, as to the skin, mucous digestive surface, extremities, &c., with the view of assisting other agents in soliciting or recalling it from the seat of disease. The exercise, also, of organs which possess not secreting functions, will likewise favour an augmented flow of blood to them. Thus, exertion of the mental faculties and the passions determine an afflux of blood to the brain; and of the muscular organs, to the spinal chord, muscles, and heart. It is of importance to be aware that the irregular distribution of the blood, whether of this or of other kinds, may take place either when this fluid is more abundant and richer than natural, or when it is deficient as well as poor; and that the change from the healthy state of the circulation is to be imputed to the state of influence exerted by the organic class of nerves distributed to the vessels, which, thus influenced,

control the volume of the blood circulating through them (§ 27.), as well as modify its states and the rapidity of its circulation. The particular determinations of blood are noticed in their respective articles.

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30. ii. **THERAPEUTICAL DOCTRINE.** — *Derivation* — *Reulsion*. The doctrine of determination of blood sufficiently indicates the propriety of having recourse to means in the cure of various diseases, calculated to solicit a flow of blood to parts where this may be done safely, and to diminish the quantity sent to the seat of disease. This mode of practice is well understood, and very generally employed by the older physicians, upon the well-known pathological principle that “*ubi irritatio, ibi fluxus*.” It must not, however, be overlooked that irritation will not always procure afflux of blood; and that it is therefore not altogether identical with derivation, either in a pathological or a therapeutical point of view. It does not come within my limits to point out the difference; but they are so far alike, that, in order to produce the latter, we frequently have recourse to the former. At the same time we must recollect that irritation will sometimes be of service even independently of any afflux of blood that may accompany it, or even although it should fail of producing this effect.

31. It is almost unnecessary to enumerate the means, which we occasionally have recourse to in order to occasion a local determination of blood, and thus derive it from the seat of disease. These consist of numerous agents: — *a*. Such as increase the circulation in the rete mucosum, as rubefacients, sinapisms, external heat, &c.: *b*. Those which, in addition to augmented circulation, procure a discharge from the surface or part to which they are applied, as scalding water, blisters, irritating ointment, &c., purgatives and cathartics, &c.: *c*. Those which, by procuring a flow of the natural secretions, solicit an afflux of blood to the secreting organs, as certain purgatives, diurgics, and diaphoretics: *d*. Those which evacuate the viscera, increase the discharges from their mucous surface, and augment the secretions in adjoining organs, as emetics, cholagogue purgatives: *e*. Those which influence the circulation in the limbs and extremities, as frictions, the semicupium, various forms of pediluvia and manuluvia; abstraction of blood from the feet or hands, by venesection, leeches, or cupping; stimulating or scalding pediluvia, &c.: and, *f*. Those which permanently irritate and procure a continued discharge, as deep scarifications, incisions, setons, issues; caustic applications, as the alkalies, the inner bark of mezereon, moxas, &c.

32. All these occasion, in the first place, irritation in the part to which they are applied, and, consequent to this, an afflux of the circulating fluid. Some of them produce the primary, more remarkably than the secondary effect; and when this is the case, the pain which is felt is often an

index of the extent of the former. This is the case with blisters, rubefacient epithems, sinapisms, and scalding applications; and therefore much advantage is obtained from them in various diseases, independently of their secondary operation, particularly when we wish to rouse the torpid or oppressed functions of an adjoining or subjacent organ. When derivation is, however, our principal object, they cannot always be depended upon, particularly in irritable habits, and in the early stages of acute diseases. They ought never to be employed in the stage of excitement in fever, unless this stage be irregular, imperfectly developed, or inefficient; nor in inflammations, until acute action is subdued by depletions, evacuations, and other means, — when only artificial derivation can be expected to have any influence in diminishing the remaining disorder, and lessening the risk of effusion. This caution is especially deserving of attention in respect of blisters, — the cantharides of which, particularly if improperly allowed to remain too long on a place as they often are in diseases of excitement, being often absorbed into the circulation, thereby increasing the general as well as local vascular action. These applications, also, ought not to be directed to the vicinity of parts suffering from violent excitement. I have often seen mischief produced by blisters having been directed to the head and throat in such cases of the subjacent parts.

33. The means usually employed in order to derive the flux of blood from diseased parts are variously combining, and much discrimination is requisite both in the choice and in the combination of them, appropriately to the state and nature of the diseased action at the time. The scope and limits of this work preclude my entering upon this important branch of the subject; but it has received attention when discussing the treatment of those diseases in which the various means of derivation are required: and the appropriation of those means to the different states of vascular action is there attempted with some degree of precision.

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IV. DEFICIENCY OF BLOOD. SYN. *Anæmia* (from the privative *an*, and *aima*, blood). Bloodlessness. *Anémie*, Fr. *Der Blutmangel*, Ger. *Dyspepsia Anæmia* (Young). *Mareasmus Anæmia* (Good).

CLASSIF. 3. *Class*, Diseases of the Sanguiferous Functions; 4. *Order*, Cachexies (Good). I. *CLASS*, V. *ORDER* (Author).

34. **DEFIN.** A deficiency of blood in the whole

body or in some important organ, not proceeding from natural or artificial hæmorrhage, giving rise to a waxy, bloodless state of the countenance and surface, emaciation, feeble quick pulse, and great languor and debility.

35. Defect of blood, bloodlessness, or anæmia, although not of frequent occurrence, is yet occasionally met with, particularly in its less remarkable, or local forms. In connection with chlorosis it is oftener observed. Cases of anæmia have been recorded by REISGLIUS, SWHENEK, and others; and the disease fully described by BECKER, ALBERT, JANSON, HOFFMANN, DE HAEN, ISENFLAMM, LIEUTAUD, HALLÉ, ANDRAL, and several pathologists and practical writers of the present day. I shall first offer a few general observations on local anæmia; and afterwards describe more fully general anæmia and its complications. The deficiency of blood, occasioned by natural or artificial losses of it, is considered under a distinct head.

36. i. PATHOLOGY OF ANÆMIA. — 1st, *Local anæmia*. Deficiency of blood in an organ or part is evidently the result of one or more of the following pre-existing lesions: — *a*, Of diminished influence of that portion of the ganglial or organic class of nerves which supplies the blood-vessels of the organ; *b*, Of defective vital expansion of its capillaries, probably due to the depressed state of the system exerted on the vessels by the nervous system; *c*, Of mechanical impediments in the way of a sufficient supply of blood; *d*, Of imperfect development, or diminution of calibre of the arteries by which blood is conveyed to the organ; *e*, Of disease of the organ or part, or an imperfect exercise of its functions; and, *f*, Of unusual flux of blood to other quarters, causing a proportionate diminution of it in others. It is evident that these states are merely local, and are capable of co-existing with other changes affecting the whole mass of the circulating fluid, as respects both its quantity and its quality; and that various disorders of function, according to the particular state on which the anæmia depends, and the extent to which it may exist, will be the consequence.

37. The organs most subject to this condition of their circulation are, according to M. ANDRAL, the lungs, the brain, the liver, the substance of the heart, the stomach and alimentary canal, and some of the voluntary muscles. To these I would add, the spleen, the ovaria, and the generative organs of the male. In many of these, as in other parts, atrophy is associated with the anæmia; and may be considered, in the majority of cases, as the consequence of it. The symptoms of local anæmia are not always manifested during life; but they frequently are, as I shall have occasion to point out, when considering the morbid conditions of those organs most subject to this change. Thus, in the completest of all the states of local anæmia, as when the obliteration of an artery cuts off all supply of blood to the organ, gangrene will result; frequently, when anæmia is seated on the brain, a form of convulsion is the consequence, with other symptoms stated in the article on this subject (see BRAIN — *Anæmia of*); and when the ovaria, at the period of puberty, is not supplied with the requisite quantity of blood, owing to deficient influence of the ganglial nerves distributed to the organs of generation,

chlorosis, sometimes with more or less of general anæmia, is the constant effect.

38. 2d. *General anæmia*. — The blood circulating through the body may be most remarkably deficient, in respect both of its quantity, and of the relative proportion of red particles. In many cases in which the absolute quantity of blood in the body is diminished, the globules are still more remarkably deficient, they being insufficient to give the blood its usual deep colour. General anæmia presents itself in practice, 1st, as a primary disease; 2d, as a consequence of pre-existing lesions of some one of those organs which are concerned in conveying the nutritious fluids into the blood, or in the processes of sanguification; 3d, associated with other diseases, resulting equally with it from some antecedent affection, the nature of which cannot, perhaps, be readily recognised.

39. *A. The primary forms of anæmia*, when closely analysed, seem to proceed, 1st, from deficient nourishment; 2d, from deficient vital power, — from a torpid or depressed state of the influence of the organic class of nerves on the digestive, assimilating, sanguifying, and circulating organs which they supply. — *a*. The influence of deficient supply of nourishment in producing anæmia may be readily imagined, and instances showing it are numerous; I will merely allude to one: — M. GARRARD, whose researches have tended much to advance the state of the pathology of the fluids, has illustrated this part of the subject by observing the remarkable degree of anæmia which existed in a large proportion of the inhabitants of a district devastated by famine, who lived upon grass. A more common and less expected form of general anæmia is that which arises from the injudicious restriction of diet and regimen, during convalescence from acute diseases, particularly those which have required large depletions. Several instances of this state of disease have come before me, and would, I am confident, have terminated in dropsical effusions (§ 44.) or in death, if a different system had not been adopted.

40. *b*. A torpid state of the organic class of nerves, in one of the most influential, if not the most frequent, antecedent affections to which we can impute this state of the circulating fluid. It is extremely probable that those instances of its occurrence from being shut out from the sun's influence, and the constant respiration of an unwholesome air, arise from the continued privation of salutary stimuli to this important class of nerves, upon which the sanguifying processes depend.

41. The influence of the sun's rays in promoting all the vital actions, particularly those of organic life, probably from modifying the electromotive state of the frame, must be evident to all. The good effects of light and air are shown in the vegetable kingdom, the circulating fluids of which cannot be duly formed without exposure to both. The sun's rays diffuse a genial influence through the frames of the aged, and excite the organic and generative functions of the young. It has been observed that those persons who are entirely excluded from the light of the sun, and breathe the close air of mines, are particularly subject to general anæmia. M. CROMER has given a very interesting account of the disease which

affected the workmen employed in a coal mine at Auzain. It commenced with colicky pains, meteorismus, blackish green stools, dyspnoea, palpitations, great prostration of strength, followed, in ten or twelve days, by a yellowish or waxy and bloodless appearance of the countenance. The capillary vessels disappeared from the conjunctiva and mucous surface of the mouth; and the pulsation of the arteries could scarcely be felt. The patients complained of palpitations, anxiety, oppression and suffocation on exertion, paroxysms of fever, profuse perspirations, œdema of the countenance, and rapid emaciation. This state continued for six months or a year; and in some cases terminated fatally, with the reappearance of the invading symptoms. Four of these patients were sent to Paris for treatment, and were ordered light nutritious diet, bitter infusions, &c. One of them died; and on dissection, the arteries and veins were found almost void of blood, containing merely a little sanguineous serum, and little or no blood flowed from the parts divided during the inspection. The appearances in this case led Mr. HALLÉ to prescribe iron filings in the dose of a drachm daily, with tonics and opium; and, under this treatment, all the symptoms gradually vanished, the capillary vessels reappearing on the surface.

42. B. It is probable that general anæmia will not take place, unless consecutively of remarkable torpor of the vital influence, or of some other morbid condition of one or more of the organs which contribute to the formation of blood. Where the digestive powers and the functions of the liver are weakened, anæmia to a slight degree is not infrequent. Its connection with chlorosis is merely that of an associated effect of pre-existing depression of the influence of the system of organic nerves. (See CHLOROSIS.) The lungs have been considered by some authors as the organ which is chiefly concerned in the production of anæmia, and consequently have been viewed by them as the seat of hæmatisis, or at least the place where this process is completed. Without disputing that such is the case to a certain extent, I am disposed to view the liver as being equally, if not more, concerned in this function,—an opinion long since contended for in my *Physiological Notes* (see *Appendix to M. RICHERAND'S Elements of Physiology*); and consequently as being in many cases very influential in the production of general anæmia. It is probable, however, that other viscera or parts may also give rise to it. Thus it may be admitted that total obstruction of the thoracic duct will occasion it; and I have repeatedly observed it in children affected with various chronic diseases of the viscera of organic life; being here, as in most cases, one of the results of imperfect digestion and sanguification, as well as of obstruction to the passage of chyle into the blood. One of the most remarkable cases of general anæmia was recorded by Dr. COMBE. In it all the viscera were found nearly bloodless, excepting the spleen; but not diseased in other respects, at least not to the extent of impeding their functions. The thoracic duct and absorbent system were not examined.

43. The symptoms of anæmia have been nearly all alluded to in the foregoing remarks. I may, however, enumerate them briefly at this place. They consist of a pale, waxy, or blanché appearance of the countenance and integuments, in

which the cutaneous veins are scarcely seen; and those which appear are pale, apparently empty, do not fill quickly, or scarcely at all, upon pressure made upon them; and, when emptied, fill very slowly. The conjunctiva has lost its red vessels; the lips, tongue, and inside of the mouth are pale; the pulse feeble, small, irregular, and readily made still quicker or fluttering upon mental emotion; the patient is languid and very weak; complains of flatulence, borborigmi, and an irregular state of the bowels, with want of appetite, and an occasional nausea; a sense of sinking and syncope, particularly upon assuming the erect posture, followed by palpitations; oppressed, short, hurried, and sometimes gasping respiration; irregular convulsive or spasmodic movements; tremors; œdema of the ancles; and in some cases the more severe symptoms described as following sinking after large depletions (§54.) In the more unfavourable cases the patient may be carried off by a fit of syncope upon assuming quickly the erect posture; or by a convulsion; or sink with the symptoms of exhaustion, or with those of effusion on the brain, or in the pleural or pericardial cavities. It most commonly runs into one or more of the complications about to be noticed.

44. 3d, *Complicated anæmia*.—Deficiency of blood respects both its diminished quantity and its poor quality. A defect of red globules, is often associated with a local disease, of which it is generally the consequence; but it also may give rise to various affections, both functional and organic. That anæmia should be complicated with certain chronic diseases of the liver, mesenteric glands, and absorbent system, chlorosis, &c. may be expected; but that it should give rise to diarrhoea, and to dropsical effusions in various parts, particularly in the shut cavities and cellular tissue, without any alteration of the solids, may not appear so obvious, although admitting of explanation. M. ANDRAL states, that he has observed anæmia in the bodies of persons who had died dropsical; and in persons who had complained of diarrhoea, profuse perspirations; and very justly considers both the dropsical effusions into the shut cavities and into the cellular tissue, and the exhalation from the digestive mucous surface and skin, as perfectly independent of any local congestion or irritation, and to be analogous to the profuse diarrhoea and perspirations which occur in persons who are brought near to dissolution by long protracted disease. In all such cases, whether attended with effusion into shut cavities or cellular tissue, or with increased exhalation from mucous surfaces, we may consider nearly the same pathological conditions to exist as their principal sources, viz. diminished tone of the exhaling orifices, with lessened vital cohesion of the tissues in which they open; a poor and thin state of the blood, the crisis of which is much lowered; and a more rapid circulation of the remaining fluid.

45. Anæmia, when existing even in a moderate degree, will often give rise to various functional disorders, which are, however, of no constant character, but differing with the temperament, habit of body, &c. The chief of these are hysterical and epileptic convulsions, palpitations, leipothymia or syncope and palpitations alternately, irregular or anomalous convulsions and spasms,

chorea, and various nervous tremors resembling chorea, dyspnoea, sickness or vomiting, cedema of the ancles, diarrhoea, headach, &c., with weak, small, quick pulse; pale, waxy, or doughy state of the countenance; listlessness, flatulent state of the abdomen, gastralgia, colic pains, very weak digestion, vermination, and irregularity of the fecal and urinal evacuations. It will also be followed by atrophy and softening of several of the internal viscera, and general emaciation.

46. In cases where general anæmia is not excessive, it may be admitted that both inflammation and hæmorrhages may still occur, particularly the latter, from the causes usually producing them; and that they will have a remarkable tendency to terminate unfavourably, owing to the state of the system causing the deficiency of blood, to this defect itself, and to the want of vital resistance, as well as to the incompatibility of most of the means of cure with the state of the constitutional powers and of local action.

47. CAUSES. — Several of the causes of anæmia have been already alluded to (§ 39—42.). There may be others which have not yet been ascertained. I must state, however, briefly and generally, those which have been usually acknowledged. They consist of insufficient and poor food; excessive secretions and evacuations; masturbation practised early in life, and long continued; long exposure of the body from the direct influence of solar heat and rays; protracted confinement in crowded apartments, in the stagnant and impure air of manufactory cities, especially when affecting children or very young persons; and the constant respiration of moist, impure, and miasmatic atmosphere, from which the sun's rays are shut out. All these exhaust or depress the vital and nervous powers; whilst some also either cut off the necessary supply to the circulating fluid, or waste its richer constituents. To these causes may be added certain malignant organic diseases, as carcinoma, &c., which, in the latter stages, is always attended with more or less of anæmia; impeded development of organs, particularly those belonging to the generative functions, whose perfect evolution is requisite to the salutary excitement of all the organic actions, especially those of digestion and sanguification; and lesions which either impede these latter functions, and interrupt the passage of chyle into the blood, or vitiate these fluids.

48. TREATMENT. — The most rational and the most successful means that can be employed consist of such as are calculated gently to excite and permanently to promote the organic functions. Of these, the most appropriate appear to be the various preparations of iron, bark, sulphate of quinine, camphor, ammonia, small doses of iodine, æther, &c. combined occasionally with opium, hyosciamus, extract of hops, conium, &c. when the disease is attended with colicky pains. Conjoined with these, the chalybeate mineral waters, stimulating frictions of the surface, light and digestible food, gentle exercise in the open air, particularly on horseback, and change of air, will be found of much service. During the employment of tonics, due attention should be paid to the state of the secretions and excretions; and, when the bowels are constipated, the more tonic and less irritating aperients be resorted to. Of these, perhaps, the best are rhubarb, and aloes,

the aloes and myrrh pill, the compound iron pill, &c.

49. When the state of the system is attended with hysterical, convulsive, and other nervous affections, a combination of tonics and chalybeates, with antispasmodics, as the preparations of valerian, ammonia, zinc, myrrh, extract of hops, galbanum, æther, strychnine, and various others, is indicated. If we have reason to suspect that the anæmia is a consequence of obstruction or of torpor, combined with an enlargement of some organ or part concerned in the formation of blood, the preparations of iodine, the liquor potassæ alone or combined with tonics, the subcarbonate of soda, the boracic acid, and sub-borate of soda, are the best medicines with which I am acquainted.

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V. MORBID EFFECTS OF LOSS OF BLOOD. — 50. This is a subject of greater practical importance than has generally been attached to it; and one which I have had numerous occasions to contemplate, particularly from the years 1816 to 1828, — an epoch during which blood-letting was either more generally adopted, or carried further, than the nature of several diseases, and the constitutions of many patients, warranted. The effects of large depletions have been well illustrated by the experiments of Dr. SEEDS, which have shown, what indeed might have been anticipated from the physical condition of the circulation within the cranium, viz. that we can never hope by depletion alone to materially diminish the quantity of blood in the vessels of the brain. Dr. M. HALL, and the Author, have also shown that several morbid states may be occasioned by large losses of blood, or by too large a proportion of this fluid circulating in the head, relatively to the rest of the body, as a consequence of large blood-letting; and M. PIGNY has illustrated the same subject by numerous experiments, and has offered many instructive and practical observations on it, particularly in relation to diagnosis.

51. The morbid effects of loss of blood may be advantageously considered in relation, *first*, to a person previously in health, or not affected by dangerous disease; and, *secondly*, to persons labouring under different diseases in which loss of blood may occur, either naturally or from injudicious practice. My observations on both these branches of the subject must necessarily be brief, more particularly on the latter, as the topic is not overlooked in the consideration of the treatment of those diseases in which such losses are most likely to be met with.

52. i. MORBID EFFECTS OF LOSS OF BLOOD IN PERSONS NOT PREVIOUSLY AFFECTED WITH SERIOUS DISEASE. — These effects will naturally vary with the suddenness or rapidity of the loss, the extent to which it has proceeded, and the habit of the person, especially as regards vascular plethora, at

the time when it occurred. It is evident that an evacuation which has been rapid will have a more marked and serious effect, than the same quantity removed at several times, or in a slower manner; and that, when blood is discharged at intervals, a much larger quantity may be lost without producing the morbid effects often resulting from the sudden loss of a smaller quantity; or, if they occur, they may be of a different kind from those which follow rapid discharges. The subjects, therefore, which chiefly require consideration are, 1st, The immediate effects of large loss of blood; 2d, The more remote consequences; and, 3d, The slow and insidious effects supervening on repeated losses, each occurring to a small or moderate extent.

53. *A. Of the immediate effects of large losses of blood.*—These are, vertigo, leipothymia or a sense of sinking, syncope; feeble and slow, or sometimes quick fluttering pulse; slow or apparently suspended respiration for short periods, interrupted by deep sighs; eructations from, and sometimes sickness of, stomach; a cold, pale, and bedewed countenance and general surface; irregular sighing and yawning, generally followed by a return of the pulse and of consciousness; and, if the hæmorrhage is not renewed upon the restoration of the circulation, recovery soon follows. Where, however, the loss of blood is greater, the above symptoms are more marked; the syncope is more profound; the respiration, which is carried on during this state entirely by the diaphragm, is nearly imperceptible, until it suddenly returns at intervals, with deep sighs: sickness and vomiting occurs, and restores consciousness for a time, but the patient again relapses into syncope, which is broken in a similar manner; and, if the loss of blood has ceased, a more permanent restoration follows the sighing and sickness, and recovery slowly takes place.

54. When, however, the loss is still greater either absolutely or relatively to the energies of the patient, or if it continue after the above effects supervene, the return of consciousness is often attended with some degree of delirium; a difficult stertorous breathing; dyspnoea; gaspings for breath; occasionally retchings, and discharge of the contents of the large bowels; an irregular, intermittent, feeble, or imperceptible pulse; loss of animal heat; great restlessness, violent shudderings, or general tremors, and jactitation, sometimes so violent as to shake the bed upon which the patient lies; a sense of sinking through the floor; convulsions, or tetanic spasms, and contractions; terrible gaspings for breath, and death.

55. Such is the common grouping of the morbid effects; but some of them are more marked than others. Thus, when the loss of blood is very large, the patient may suddenly and unexpectedly expire in one of the fits of syncope which occur, or he may sink more gradually, without any appearance of delirium or convulsion, sometimes with the faculties entire to the last. The former may occur after excessive blood-letting or hæmorrhage, when the patient has been incautiously raised up, or when he has not been instantly placed in the recumbent posture when syncope occurred: the latter has taken place unexpectedly when blood-letting has been carried too far, or too often repeated, in the recumbent posture.

56. *Convulsions* are often the most marked effect, either of excessive hæmorrhage or of large and repeated venæsection in the recumbent position; particularly if it be carried to leipothymia or syncope in this position, which ought always to be avoided. This symptom is very common after puerperal hæmorrhagy, or any large losses of blood occurring in females, particularly those of an epileptic or hysterical diathesis, and in children or young subjects.

57. *Delirium* is another prominent effect of excessive evacuation of the vascular system; but it usually presents something peculiar. The carotids are often neither full nor strong, the countenance is pale, and the head cool,—symptoms indicating, with the character of the delirium, impaired vital energy of the brain. In some cases the delirium is associated with convulsions, and both may ultimately be followed by coma or lethargy. Delirium more rarely occurs in children or young subjects from excessive loss of blood, than in adult or advanced age; but coma, as will be shown hereafter, is not infrequent in the former, particularly when the loss of blood has occasioned convulsions, which in them usually terminate in coma.

58. *B. Of the more remote effects of large loss of blood.*—When the patient is not carried off by the more immediate effects of excessive loss of blood, reaction supervenes, and often becomes excessive. It usually commences with palpitations, and flappings through the body, but particularly in the carotids and arteries of the head, giving rise to the peculiar noises, of which patients so often complain after large depletions. The pulse now becomes quick, sharp, and soft; and there is sometimes distressing nervous pulsation of the aorta. In the more marked cases of reaction, the patient complains also of pain of the head; intolerance of light and of noise; a sense of tightness or pressure around the head; hurry of mind, and sometimes delirium, particularly in the night; restlessness, agitated sleep, often accompanied with a sense of sinking or impending dissolution, fearful dreams, &c. The arteries throb; and the pulse ranges from 110 to 140, is jerking, sharp, open, and bounding, but readily compressed. The respiration is hurried, panting, and frequent; often attended with sighing, a desire of fresh air, great restlessness, and in females for aromatic perfumes, or the smelling bottle. The mouth and throat are dry; there is much thirst; and the skin is usually hot, but the extremities, particularly the lower, are generally cold.

59. This state has not infrequently been mistaken for one requiring depletion; and I have met with cases in which the idea of inflammatory action had so taken possession of the mind of the practitioner, as to induce him to employ large or repeated depletion, which had been followed by this state of reaction, for which he was proceeding again to deplete, mistaking the morbid effects of the previous excessive loss of blood for a return of the inflammation. If this state of reaction be not judiciously managed, exhaustion rapidly supervenes; and almost as soon as it occurs death may take place, frequently upon some muscular effort, or upon getting up from the recumbent posture. In some cases, particularly in children and young subjects, the delirium or morbid sensibility of the brain, characterising the reaction,

passes rapidly into a state of lethargy and coma, which on numerous occasions I have seen mistaken for effusion of serum within the cranium, or hydrocephalus, particularly when it has been preceded by convulsions, as is often the case in children. In many such cases, either no effusion is found, or the effusion is to an extent insufficient to account for the comatose symptoms.

60. Under more favourable circumstances the reaction is gradually followed by returning health, or lapses into a state of chronic exhaustion or asthenia, which is variously characterised. In some cases it is attended by somnolency, alternating with slight delirium, &c.: in others, by fits of dyspnoea, palpitations, frequent cough; hurried, laborious breathing; a flatulent, tympanitic state of the abdomen: in several, by pale, emaciated, or discoloured countenance and skin; amaurosis, nervous tremors, or jactitation; delirium, or mania. and in puerperal females by a form of mania which requires to be carefully distinguished, and which is particularly noticed under the article on *Puerperal Mania*. In addition to these functional disorders, following reaction after large losses of blood, organic changes may supervene; such as effusion of serum and extravasation of blood upon the brain, effusion into the bronchi and air-cells, dropsical effusions in various parts, and flatulent distension of the stomach and bowels. When recovery takes place, the pulse always continues small and frequent for a long time, owing to the remarkable diminution of the fluid in the vessels.

61. C. Of the insidious effects produced by small but often repeated losses of blood. — Loss of blood occurring in this manner produces effects different from those now described. They generally, as may be expected, advance slowly, and often exist either altogether, or a long time, without detection. They are extremely various, according to the age and constitution of the person. They most frequently occasion a pale, leucophlegmatic, and lax appearance of the countenance and surface; a very quick, weak, and irritable pulse; hurried, and oppressed respiration; frequent palpitations, and sense of sinking; borborugmi, and hysterical symptoms; flatulent distension of the colon, and colicky pains; swellings of the ankles, and dropsical effusions in other parts: in females, difficult and scanty menstruation, chlorosis, deviations of the spinal column, epileptic convulsions, pains in the loins, and various anomalous affections of a painful or spasmodic kind; tremors, and irregular action of muscles; chorea; paralysis; dyspeptic disorders, with irregularity of the bowels; a disposition to syncope; amaurosis; and all the symptoms of anæmia, which indeed is the primary or real state of disease produced, and constitutes the chief change detected upon examination after death; together with serous effusion in some situations, and a pale bloodless state of the viscera, and of the heart itself.

62. ii. OF EXCESSIVE LOSS OF BLOOD IN THE COURSE OF VARIOUS DISEASES. — There are two important considerations which should not be overlooked in practice; viz. that in many diseases, apparently attended with excitement, we shall meet with cases in which the actual quantity of blood in the body is much less than usual; and in various others, blood-letting will often not be

borne, although seemingly indicated, and although the quantity of blood in the frame be not lessened. In illustration of the former of these, I may state that many years ago I had an opportunity of remarking minutely the appearances on dissection of a man of middle age, and somewhat fat, who had complained of an acute and painful disease, obviously functional, for which he had been bled only twice on successive days, and on neither occasion to above thirty ounces; and yet the symptoms of excessive loss of blood appeared, from which he died in twenty-four hours after the second depletion. The most careful examination could detect no organic change, excepting the remarkably bloodless and pale state of all the viscera. Even the brain was less vascular than usual. That in various diseases, unattended by diminution of the circulating fluid, depletion will produce marked symptoms of depression and sinking, owing to the state of the vital power being insufficient to accommodate the vessels, by their tonic or vital contraction, to the reduced bulk of the blood, is well known, and has been fully discussed in the articles on *Adynamic Fevers*, *Erysipelas*, and *Puerperal Fevers*; in which, as well as in puerperal mania, and various other acute diseases, large vascular depletion is often most injurious.

63. A. Of excessive loss of blood in diseases of excitement. — The morbid effects of large depletions will necessarily vary with the nature of the disease in which they are employed. When carried too far, in cases of excitement, where the nervous or vital power is not depressed, and the blood itself rich or healthy, reaction generally follows each large depletion, and thus often exacerbates or brings back the disease for which it was employed, and which had been relieved by the primary effects of the evacuation. This is more remarkably the case in acute inflammations of internal viscera, particularly of the brain or its membranes. Thus, every observing practitioner must often have noticed, that a large depletion, when carried to deliquium, will have entirely removed the symptoms of acute inflammation when the patient has recovered consciousness; and that he expresses the utmost relief. But it generally happens that the inordinate depression — the very full syncope that is thought essential to the securing of advantage from the depletion — is followed by an equally excessive degree of vascular reaction, with which all the symptoms of inflammation return; and the general reaction is ascribed entirely, but erroneously, to the return of the inflammation, instead of the latter being imputed to the former, which has rekindled or exasperated it, when beginning to subside. The consequence is, that another very large depletion is again prescribed for its removal; and the patient, recollecting the relief it temporarily afforded him, readily consents. Blood is taken to full syncope — again relief is felt — again reaction returns — and again the local symptoms are reproduced: and thus, large depletion, full syncope, reaction, and the superposition on the original malady of some or all of the phenomena described above as the consequence of excessive loss of blood, are brought before the practitioner, and he is astonished at the obstinacy, course, and termination of the disease; which, under such circumstances, generally ends in dropsical effusion in the cavity in

which the affected organ is lodged; or in convulsions, or in delirium running into coma; or in death either from exhaustion or from one of the foregoing states; or, more fortunately, in partial subsidence of the original malady, and protracted convalescence. Such are the consequences which but too often result — which I have seen on numerous occasions to result, when blood-letting has been looked upon as the only or chief means of cure — the “*sheet anchor*” of treatment, as it too frequently has been called and considered during the last twenty years.

64. *B. Of the mode by which excessive loss of blood in disease may be best avoided.* — *Method of conducting blood-letting.* From the above it will appear obvious, that if blood-letting were better managed, and directed so as to make an impression on the local ailment, but in such a manner as to avoid being so readily followed by the reaction which reproduces the ~~glady~~ for which it was employed, great advantage, in practice would result, and much less blood require to be removed even in the most acute cases. *a.* In order to accomplish this, I have long been in the habit, — and have inculcated it in my lectures on the practice of medicine, from 1824, — of directing the following mode of practice when large blood-lettings were required in the treatment of visceral inflammation: — The patient should be either in bed, or on a sofa, and in the sitting or semi-recumbent posture, supported by several pillows. The blood is to be abstracted in a good-sized stream, and the quantity should have some relation to the intensity and seat of the disease, and the habit of body; and age of the patient, but chiefly to its effects; it should flow until a marked impression is made upon the pulse, and the countenance begins to change. Further depletion must not now be allowed; but the finger should be placed on the orifice of the vein, the pillows removed from behind the patient, the recumbent posture assumed, and the arm secured. Thus a large quantity of blood may be abstracted, when it is required, without producing full syncope, which should always be avoided; and when a large loss of this fluid is either unnecessary, or might be hurtful, the speedy effect produced upon the pulse and countenance by the abstraction of a small quantity will indicate the impropriety of carrying the practice further. In this manner I have often removed about forty ounces of blood, where large depletion was urgently required, before any effect was produced upon the pulse, but always carefully guarding against syncope; and by the subsequent means used to prevent reaction, no further depletion has been required.

65. *b.* In order, however, to obtain this object, a treatment varying with the nature of the disease is required. Repeated doses of tartarized antimony, either given in small quantities at very short intervals, or in large doses, combined with opium; full doses of calomel, antimony, and opium; of camphor, nitrate of potash, and colchicum; or of ipecacuanha, nitre, and opium, &c., particularly the first of these, exhibited so as to excite nausea, but guarding against retching as being liable to induce reaction; and the individual antiphlogistic remedies, appropriately directed, and combined according to the circumstances of the case, are the chief means

which I have employed to prevent the return of increased action after blood-letting conducted as now stated. The particular measures which may follow blood-letting are fully explained in the articles on *Inflammation of the different Organs*; but I may now mention, that when opium is given with the view of preventing the recurrence of reaction, it ought to be exhibited in a large dose at once, (two or three grains,) either with a full dose of James's powder, or any other antimonial, or with two or three of ipecacuanha, conjoined with some one of the other substances above mentioned.

66. It should be kept in recollection, however, that reaction after large depletions is chiefly apt to occur in idiopathic inflammations, and other diseases of excitement, in which the constitutional or vital powers are neither remarkably lowered nor depraved; and when the circulating fluid is not vitiated by the retention of those substances in it which require to be eliminated, nor by the absorption of matters which are foreign to its nature, and injure its purity. Reaction is very apt to follow large losses of blood, in acute rheumatism; in inflammations of the membranes of the brain, and, indeed, of all serous or fibro-serous membranes; and by its recurrence to reanimate the ~~the~~ action; so that a person may be bled to that state which has been described as the extreme result of ~~the~~ loss of blood, (§ 54.) and yet, trusting to this practice alone, the local disease has either not yielded, or has passed into one or other of the unfavourable ~~the~~ terminations it is liable to assume, particularly dropsical effusion. In the course of practice I have frequently seen persons who had experienced attacks either of pleuritis, pneumonia, peritonitis, enteritis, or of some other inflammation, and who had recovered with great difficulty, and after a long convalescence. Upon enquiry, I found that they had always been bled largely, and to syncope, — some of them four, five, or even six times, but scarcely ever less frequently than thrice; and yet, upon a subsequent attack of inflammation in its most acute form, in the same or some other organ, a single depletion, practised as I have recommended above, and followed by the means most likely to prevent the return of reaction afterwards, to subdue the local action, to solicit the flow of blood to other parts, and to equalise its distribution over the body, has been sufficient; or, at most, a single repetition of the venesection has been all that has been required.

67. *c.* When the chest is dull on percussion, the heart congested, the liver large, and the veins distended; or when the circulation is full and strong, the capillaries injected, the lips and mucous surface red, the muscles firm and large, or the respiration oppressed, blood-letting is generally required, and is well borne. It is also necessary even when the pulse is languid, the external venous circulation difficult, and the surfaces pale, if these symptoms be conjoined with those indicating internal congestion. (See CONGESTION.) On the other hand, persons with an open, soft, full pulse, florid countenance, lax muscles, &c., although they may bear moderate loss of blood, yet suffer more from large depletions than those of a pale, dry, thin, but muscular and rigid habit of body.

68. Under no circumstances ought a patient to

be blooded whilst his head is nearly on the same level with the trunk; and the utmost care should be taken in having recourse to venæsection in cases of dilatation of the cavities of the heart, particularly those of a passive nature. It is seldom necessary in such cases: and if circumstances should arise to require it, the blood should be taken, in the manner I have inculcated (§ 64.), from a small orifice and to a small extent. In the majority of cases, the state of the venous circulation, if duly examined, furnishes some information as to the quantity of blood in the system, and therefore sometimes becomes a valuable guide to blood-letting in some doubtful cases.

69. When the superficial veins are distended, of a deep or dark colour, and the blood flows quickly, and the veins fill rapidly on applying friction and pressure—indicating that their usual state of fulness does not depend upon interrupted circulation about the right side of the heart, or in any part of their course—we may infer that the system is sufficiently supplied with blood. But if the veins are small or pale, the body not being fat; if they swell slowly upon a ligature being applied above them; or are readily emptied by friction, and very slowly refilled; we must infer the existence of a feeble state of the circulation, and a deficient as well as poor state of the blood: the former will be further verified if we find it associated with a pale sickly appearance of the countenance and integuments; a small, feeble, and quick pulse; and paleness of the lips, con, inctiva, tongue, and gums. (See § 43.)

70. *C. Of loss of blood in relation to diseases of depressed vital power, &c.*—There is a numerous class, or rather classes, of diseases, in which blood-letting, either in small quantity, or carried too far, is especially injurious. All those in which the circulating fluid is poorer and thinner, or less pure, than in health, particularly chronic and malignant diseases presenting more or less of the symptoms of anæmia, and disorders occurring in ill-fed and emaciated subjects; those in which the vital endowment of the blood-vessels, or their tonic contractibility, is partly lost, or manifestly reduced, as various forms of fever, puerperal and other diseases in which hurtful matters are apt to pass or to be absorbed into, or not to be eliminated from, the blood; all those in which the vital cohesion of the soft solids is diminished, and the fibrine of the blood is incapable of cohering in the manner necessary to form a tolerably firm coagulum, are injured by large bleedings, or even by depletion to any extent. In the first of these, it is obvious that blood cannot be spared: in the second, although its loss might not be felt in other respects, the vessels cannot accommodate themselves to the state of their contents when any considerable quantity is abstracted: and in the last, as well as in them all, the vital manifestations of the circulating system, and of the solids generally, of which cohesion is one, is so far injured, that the primary morbid condition from which they all proceed is increased by the operation; and, moreover, a greater disposition to the absorption of morbid matters is imparted to the absorbing function, when such matters are within the sphere of its operation, by the vascular depletion.

71. I may, in conclusion, remark, that all diseases essentially spasmodic, and consisting of

irregular action of muscular parts, or of altered sensibility of nerves, or of morbid exaltation of their peculiar sensibilities, even when affecting internal organs, or the heart itself, and when no conclusive evidence of inflammation exists, will either be aggravated by loss of blood—in some cases even to a moderate extent—or be readily followed by the effects which have been described as consequent upon an excessive evacuation of this fluid. But I may further add, that, in many cases, where the above reasons for abstaining from large or repeated depletions, or from venæsection, strictly apply, local depletions, under due restrictions, may be resorted to with advantage.

72. *iii. TREATMENT OF THE EFFECTS OF LARGE LOSS OF BLOOD.*—This will necessarily vary with the particular effect produced, and the state of the patient and of the disease in which excessive loss of blood occurred. The more immediate effects of the loss are the first to claim attention; the other morbid conditions, which result from it more remotely, will be considered in succession.

73. *A. Treatment of the primary effects of loss of blood.*—The more immediate effects (§ 53.) generally require the recumbent posture, free ventilation, and airy apartments; in the extreme cases, stimulants, sprinkling the face with volatile and fragrant fluids, and even the transfusion of blood. In the worst cases, and particularly when the loss of blood has occurred from the rectum or vagina, the head and shoulders should be placed lower than the pelvis; and care should be taken to ascertain whether or no internal hæmorrhage is going on, as far as this may be accomplished (see *Uterine Hæmorrhage*). In all cases of hæmorrhage, the involuntary discharge of urine and evacuation of the bowels ought to be considered most dangerous symptoms—even more so than the occurrence of convulsions—and the most decided measures should be instantly adopted. Where we have reason to suppose that transfusion will be required, it should not be delayed too long, as the risk from delay is infinitely greater than that from the operation performed by an expert surgeon, and with a proper apparatus. In cases where convulsions or delirium occur, or when these pass into coma or lethargy, it will be necessary to exhibit, internally, stimuli, as æther, spirits of ammonia, and camphor, with a little tincture of hyoscyamus; to sprinkle æther, or lavender water, or eau de Cologne, over the face and head; to apply a blister to the nape of the neck, or on the epigastrium; to support the animal heat in the trunk of the body and extremities; and to administer the lightest and blandest nourishment. Recovery from large loss of blood is usually quick, when the functions of digestion and assimilation have not been greatly injured by it; but when they remain imperfect, or remarkably disordered for some time afterwards, we may dread the formation of visceral disease, and should direct change of air, voyaging, and travelling, with the use of tonic and deobstruent mineral waters, and appropriate internal medicines.

74. *B. Treatment of reaction after large loss of blood.*—Careful reference ought to be had by the inexperienced practitioner to the symptoms indicating this state (§ 58.), so as to distinguish between them and the general excitement consequent upon internal inflammation. This state will require means modified according to the fea-

tures it assumes. But generally the morbid reaction existing in the head, and rendering all the senses remarkably acute, and the system susceptible of impressions, as well as the distressing palpitations of the heart, require the utmost quiet, and small doses of hyoscyamus, or extract of hops, with the preparations of ammonia, and mild nourishment. Where the throbbings or pains in the head are urgent, the surface of the head warm, or delirium exists, cold spirituous lotions, applied over the head, and full doses of hyoscyamus with ammonia, or moderate doses of the acetate or the muriate of morphia, with weak brandy and water, and warmth applied to the lower extremities, will be required.

75. *C. Treatment of consecutive exhaustion, or sinking.*—Here stimulants are required in larger doses; and should be administered by the mouth, in the form of enema, and externally. It is possible that transfusion would afford some service in this state of the system. If coma be present in this stage, large doses of camphor, æther, and ammonia are required, with the tepid effusion on the head; blisters, or mustard cataplasms to the nape of the neck, or epigastrium, or to the feet. In more chronic cases of exhaustion or sinking, gentle nourishment, in small quantities and often; warm tonics, combined with gentle aperients, in order to remove morbid secretions, and relieve flatulence; nutritious enemata, or injections of gruel or mutton broth; and small quantities of weak brandy and water; are the best means that can be adopted.

76. *D. Treatment of certain effects of depletion in relation to disease.*—*a.* Large loss of blood during diseases of excitement (§ 63.) requires a treatment but little modified from that already recommended. When it has occurred during inflammations, a certain degree of irritative action may still continue, notwithstanding the excessive loss of blood, occasioning dropsical effusion into shut cavities; and, when the disease is seated in the lungs, effusions in the bronchi or air-cells, which the powers of life are insufficient to throw off, or to expel. In such cases external derivatives, and a combination of gentle stimuli, with diuretics, anodynes, and diaphoretics, in order to equalise the circulation, and to lower the irritative action in the part affected, often prove of service. When the primary disease is seated in the head, the tepid or cold affusion, cold lotions to the head; external revulsants applied to the nape of the neck, or to the lower extremities; anodynes, camphor, with hyoscyamus, or with acetate of morphia; and the promotion of the alvine and cutaneous secretions and excretions; constitute the principal measures, together with those already enumerated (§ 74, 75.).

77. *b.* Loss of blood occurring during diseases of vital depression (§ 70.) requires the most energetic means. The objects very generally are to restore, as far as may be, the vital endowment—the tonic contractility, of the vascular system, and to enable it to act with sufficient energy on the fluid circulating through it; to increase the vital cohesion of the soft solids; and to excite the secreting organs to remove the hurtful ingredients that may have passed into, or accumulated in, the remaining fluid, and which tend to vitiate the whole of the structures, and to sink still lower the already depressed powers of life. These ends

can be attained only by exhibiting, in frequent doses, the various tonics and stimuli; particularly those which tend to arrest or to counteract the morbid changes going on in the frame, and to rally the powers of life. Of this kind are the preparations of bark, or quinine, combined with camphor, the æthers, particularly muriatic æther, the preparations of serpentaria, spirits of turpentine, wine, opium, and various remedies of the same description, combined according to circumstances, and generally exhibited in small or moderate doses frequently repeated. External stimuli, rubefacient cataplasms and liniments, stimulating and tonic enemata, injections of mulled port wine, with opium and camphor, are often of great benefit. When the secretions require to be carried off, rhubarb and other tonic aperients may be employed. When the disease is attended with coma, blisters or sinapisms to the nape of the neck, epigastrium, or the feet, may be employed; and either of the following formula, in the Appendix, exhibited (see F. 423. 496. 845. 906.). If low muttering delirium be present, the same treatment as is recommended for this state in typhoid fevers is required.

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VI. ALTERATIONS OF THE BLOOD IN DISEASE.

78. It will be necessary to the estimation of the causes and results of the various changes of the blood in disease, briefly to consider the relation in which the different functions of the body stand to the blood. These functions are of the following kinds: viz. of sanguification, nutrition, depuration, and secretion; one organ performing, or contributing to two, or even three, of these offices. We know that digestion, absorption, arterial circulation, and respiration, are necessary to the formation of the blood, and to the nourishment of the tissues: we also know that absorption, nutrition, secretion, and venous circulation, are concerned in rendering the blood impure, by conveying hurtful ingredients into it, or allowing others to accumulate in it, or by destroying the relative proportion of its constituents; and that various organs, particularly those of secretion and respiration, are actively concerned in eliminating such matters as become injurious by excess, or pass into the circulation from the various sources of impurity which surround it. Hence it must be evident, that changes in the solids, and particularly in those viscera which are concerned in the supply and waste of the blood, as well as in its depuration, must be followed by changes in the state of this fluid; unless when one or two organs merely have their functions interrupted, and others performing analogous actions to those disorders assume a vicarious office. It must be evident, therefore, from this, that the doctrines of solidism and humorism are, to a certain extent, both correct; that, although disorder may originate in either, it cannot be long limited to one or the other, but must extend more or less to both, according to the nature of the causes, and the organs or parts where their impression is made. We observe in the course of practice, that certain morbid or poisonous ingesta make but little im-

pression on the system, until it is absorbed into the circulation, and by its presence there disorders various organs or parts; whilst other substances make an immediate impression on the nervous system, and, through its medium, impede the functions of secretion and depuration, and thus the blood itself is rendered impure, and the source whence all the frame is more or less vitiated. Various fevers furnish most satisfactory illustrations of this position.

79. Having already considered changes in the quantity of the blood, alterations in its qualities are next to be viewed. The facts which have been observed, connected with this subject, are few and deficient in precision; and the majority of those who have directed their attention to it, have merely described chemical conditions and combinations presented by this fluid after it had been for some time removed from the body, and had lost whatever vital endowment it may have received from the vessels and tissues in which it circulated, or had undergone important changes incidental to this state; instead of describing at the same time such vital manifestations as it may have presented upon its removal, and the relation of its chemical states to the pathological conditions of the body.

80. As we have seen that organisation commences in the chyle, and that this fluid is the chief source whence the blood itself is formed, the importance of studying the alterations of the blood, in connection with the state of this fluid, is evident; but the difficulty of the investigation generally precludes many from engaging in it. At the same time it must be admitted, that very important changes may take place, not only in the blood, but also in the fluids which supply it, and are secreted from it, without being made manifest to our senses upon the most careful examination. I shall now, *first*, furnish proofs of important changes in the constituents and state of the blood in various diseases; and next consider the causes of such changes, and the results to which they usually lead.

81. i. PROOFS OF CHANGE.—A. *In the proportion of the chief constituents of the blood.* a. The quantity of albumen varies considerably in disease. It is not sensibly diminished by large or repeated blood-letting, unless the quantity of blood, in relation to the bulk of the body, be much diminished. In many inflammatory diseases, and in a large proportion of cases of active dropsy, the relative proportion of albumen is often very much increased. This has been shown by BLACKALL, TRAIL, GENDRIN, BRIGHT, and several authors. I have always found it remarkably increased in most of the exanthemata, particularly before the eruption has come out. GENDRIN shows that, in inflammatory diseases, the serum of the blood often contains twice as much albumen as in the healthy state. When this is the case, the blood feels remarkably viscid to the touch. In diseases of debility, and when the blood is apparently deficient in quantity, and poor in quality, the albumen is generally very much diminished, being sometimes less than half its usual proportion. M. GENDRIN and M. ANDRAL think that it may also be altered in its nature as well as quantity; and I believe, from appearances which I have observed in the advanced stages of several diseases, that their opinion is correct. In these cases,

the albumen seems either precipitated to the bottom of the serum, or suspended in it like a cloud, giving it a turbid opacity.

82. b. The proportion of the watery part of the blood has been shown to vary in health; but it varies still more in disease, and even in different stages of the same malady. This change is not, however, limited to one, or even a few, of the constituents of this fluid; but sometimes is extended to the most of them. Blood-letting, in acute diseases, diminishes the proportion of coagulum; and, if diluents be supplied, increases greatly the proportion of serum, without lessening the quantity of albumen, unless the depletion be carried very far. In several chronic diseases of debility, in the stages of excitement and exhaustion in fevers, and in the last period or decline of the acute exanthemata, the proportion of serum is very considerable, owing to the interruption of the secreting functions; but in acute inflammations, and the early stages of some of the exanthemata, the blood is of a deep colour, and rich in cruur, with an increased proportion of albumen and of fibrine. In the advanced stages of disease, attended with fluid evacuations, the watery part of the blood is diminished. This is remarkably the case in the pestilential cholera, dysentery, and in some forms of dropsy.

83. c. The colouring matter of the blood evidently undergoes some alteration during febrile and malignant diseases. It has recently been supposed that such change has an intimate connection with the proportion of the saline constituents of this fluid,—a diminution of these rendering the colouring matter dark coloured, whilst an increase of them has an opposite effect; and certainly various facts seem to confirm the opinion. But this alteration is one merely in relation to colour, which is unquestionably rendered much more deep or black in the last stages of the diseases now alluded to. But besides alteration of colour, there are others which may be termed *dynamic*, inasmuch as they relate to the vital endowment of the globules, or, if not of the globules, of the fluid generally. In the diseases referred to, and after the operation of virulent poisons, the condition of the colouring matter is remarkably changed: it separates readily, and almost before dissolution, from the central corpuscles which it surrounds; and, passing through the exhalant vessels of mucous surfaces, with the serous or watery part of the blood, gives rise to the sanious cruur, and the dissolved blood, which we sometimes observe issuing from these parts shortly before or after death; and probably to the black vomit in yellow fever. In cases of infection by animal poisons or morbid secretions, this separation of the colouring matter, and solution in the serum, take place very early, indeed almost immediately after death; and it is evidently owing to this change in the blood, that the interior surface of the blood-vessels becomes so deeply coloured, without any other appearance of inflammation. Indeed, the evidence adduced by M. TROUSSEAU fully proves this to be the case. (*Archives Gén. de Méd.* t. xiv. p. 321.) This further accounts for the coloration of the interior of arteries in fatal cases of adynamic or malignant fevers,—an appearance first particularly noticed by J. P. FRANK, and subsequently by many others, and by some incorrectly ascribed to inflammation.

84. *d.* The *fibrine* varies greatly in its quantity, and as to the states in which it presents itself in the blood removed from the body. Its condition will be somewhat modified by the manner in which blood-letting is performed; but generally it soon separates from the serum, and, with the red particles, forms the crassamentum or clot, which will vary in its appearances with the degree of nervous energy exerted by the organic nerves on the vascular system, and the quantity of fibrine. *a.* First, the fibrine and red globules may be in much greater proportion relatively to the water and albumen, and still the crassamentum formed therefrom will be very different, according to the state of vascular action and nervous energy at the time when the blood was abstracted. If the vascular action be increased, or in a healthy state, and the vital energy unexhausted, the fibrine will contract into a firm and large coagulum. If the fibrine retain its relatively large proportion, and vascular action be exhausted, it will contract so imperfectly or loosely, as to enclose a large portion of the serum, and to leave but little of this fluid surrounding it. In the former case the coagulum possesses much density: in the latter, extremely little; indeed, sometimes not sufficient to separate it sensibly from the serum. In such cases the blood is *rich*, although otherwise very different in appearance, owing to the state of action and vital power.

85. *β.* In the second place, the fibrine may be in small quantity, and yet present a state of firm attraction, forming a small coagulum in the midst of a larger proportion of serum than is usual in health. Or the proportion being still small, the cohesion of the fibrine may be so weak as to form a tolerably large coagulum; whilst, in other cases, it will scarcely separate from the serum, owing either to its diminution, or the weak attraction of its corpuscles. I have met with it in several cases so nearly wanting, and so deficient in attraction in other instances, as not to form any coagulum; the red particles having been, as it were, precipitated to the bottom of the vessel in a dark or blackish sediment, without any cohesion in the form of clot. From this it will be inferred, that the quantity of fibrine cannot be reckoned from the apparent size of the coagulum merely, but from the size in connection with density or degree of cohesion. When the blood is deficient in red globules, and fibrine, it has usually received the appellation of *poor blood*; the degree of cohesion existing between the particles of fibrine in it, as well as in rich blood, being the general index of the degree of nervous power. But there are apparent exceptions to the indications it presents. Thus, in acute rheumatism, after repeated depletions, injudiciously resorted to, — injudiciously, because a frequently injurious, and seldom a beneficial practice — and during the reaction consequent upon repeated blood-letting, the fibrine, although much reduced in quantity, will often still continue to adhere firmly, or even to form, in some cases, a buffy coat, and yet the powers of life are reduced very far beyond what the state of the fibrine would seem to indicate. In these cases, the cohesion of the coagulum, and the formation of the buff, are, as well as in many other circumstances of disease, principally the result of vascular reaction, occasioned by morbid excitement of the nervous influence; and as long as these states exist, this

condition of the coagulum will occur, although depletion be carried to the utmost extent.

86. *γ.* Whilst the blood is still circulating in the body, particularly in the last stages of various chronic diseases, the repulsion existing between its existing globules may be so far destroyed as to admit of the fibrinous corpuscles adhering to each other, in some part of the vascular system, or even in one of the cavities of the heart. The fibrinous concretions thus formed are attributable, 1st, To retarded or obstructed circulation of the blood in the part. VAN SWIETEN and HALLER state that flocculent and fibrinous coagula have formed in the blood of the pulmonary artery during syncope and the cold stage of agues; and they, as well as numerous later observers, have found these productions after exposure to extreme cold, and when death has been preceded by a very languid, obstructed, and irregular state of the circulation. 2d, To effusions of a small portion of coagulable lymph from the inside of a part of the vascular lining, during a state of inflammatory irritation; which lymph may have become the nucleus around which the fibrinous particles may have collected, or the bond of cohesion between them in the first instance: and, 3d, Particularly as respects those fibrinous concretions, in the centres of which purulent or tubercular matter has been found, as in the instances adduced by MM. LÉGNON, MARÉCHAL, and subsequently by others, to the absorption of these matters, or their passage into the blood from the internal coats of the vessels on which they may have been formed; and from becoming nuclei around which the fibrine has been deposited. In some instances, in which these fibrinous masses have been found, little or no connection with the surrounding vessels can be traced. M. ANDRAL supposes that these concretions are possessed of a separate vitality, and that the matter detected in their centres is a product of vessels previously formed in them. This opinion, however, cannot be supported, inasmuch as the matters formed in their centres have no relation to, nor have they been found often surrounded by, blood-vessels; and, when vessels have been detected, the firm attachment of the concretions to the inner surface of the vessels attests the manner of their formation to be identical with that of other productions of a similar kind.

87. *δ.* But the attraction between the particles of fibrine, which is usually observed when the blood is removed from the sphere of vital endowment, in which it participates, instead of being exerted, as now stated, within some part of the vascular system, may be entirely lost, or be very irregular or imperfect. In such cases, the blood either remains altogether fluid; or its fibrine, and some part of its albumen, form grumous particles, or minute fragments, which are either suspended in the serum or mechanically mixed with it, forming a sanious cruor in the vessels. This latter state is observed sometimes locally, and often generally, immediately after death; as in the veins of the spleen, liver, of the extremities, &c. A thick, dark, and treacle-like state of the venous blood, and a venous appearance of the arterial blood, are not infrequent during life; particularly in pestilential cholera, in asphyxia, hydrophobia, &c.

88. *ε.* The *buffy coat* observed to form the upper part and surface of the coagulum, most frequently, in cases of inflammation, consists of fibrine,

according to DEYEUX and PARMENTIER; of fibrine, and especially concrete albumen, in the opinion of FOURCROY, VAUQUELIN, and THENARD; of fibrine and gelatin, according to ORFILA; of fibrine, containing serum between its fibres, and albumen, or very albuminous serum, according to DOWLER and GENDRIN. BERZELIUS considers that it may contain all the elements of the coagulum. It manifestly is produced by the concretion of the fibrine, which, parting from the colouring matter, forms a whitish yellow, or slightly greenish layer, varying in thickness from a line to one or two inches; and giving rise to the *cupped* appearance of the clot, by the firmness of attraction between its particles. The formation of the buff may be somewhat favoured by the size of the orifice from which the blood has been drawn, the rapidity with which it has flowed, and the form of the vessel in which it has been received; but the buff itself entirely depends upon the state of the fibrine, which, in conjunction with a portion of serum and much albumen, not only chiefly constitutes it, but modifies it in the manner already noticed, according to the state of vital influence and vascular action. (See § 84. and art. INFLAMMATION.)

89. *e.* Respect to changes in the saline constituents of the blood, we are provided with but little information, and with no means of a precise character. It is true, evidence has existed amongst chemists respecting the actual saline ingredients of healthy blood, and their state of combination in this fluid, that a standard has not been furnished for comparative observation. According to Dr. STEVENS, they are very sensibly diminished in the blood of patients affected by the fevers of warm climates; and Dr. O'SHAUGHNESSY has shown that the blood of those suffering from pestilential cholera contains much less saline constituents than in health.

90. *f.* The electrical condition of the blood may also be changed by disease. BELLINGRI states the electricity of venous blood to be equivalent to that of antimony; that it is an imperfect conductor of this agent; and that its electricity is diminished in inflammatory diseases. According to ROSSI, the blood presents, in severe fevers, modifications of its electrical states. That electricity, when acting energetically on the frame, affects the blood (probably through the medium of the nerves supplying its vessels) in a most intense manner, is shown by the dissolution and decomposition of this fluid after death from this agent. The evident effect of light upon the blood, in rendering it both more abundant and rich, may be attributed to the electrical states of the solar rays.

91. *g.* The temperature of the blood has been observed to vary, during the course of disease, from 86° to 104°. It has been observed as low as the former grade in pestilential cholera, and the cold stage of ague; and as high as the latter in the stage of excitement in fevers, and visceral inflammations. Its temperature is evidently owing to the degree of nervous power in connection with vascular action.

92. *B.* Changes in the intimate nature of the blood, for which mere difference in the proportion of its constituents cannot account; and which are referrible to the state of vital power.—Important changes of the blood, which are evidently not referrible merely to alteration of the healthy proportion of its con-

stituents, although such alteration may be considered as often co-existing with those other inappreciable modifications upon which its morbid effects chiefly depend, occur in the course of various diseases; and, when once induced, occasion not only violent or fatal effects as respects the individual subject of them, but also similar changes in healthy persons inoculated with this diseased blood. Dr. HOME communicated measles by means of blood taken from persons affected by them. DUHAMEL records a case of a butcher, who, having put in his mouth the knife with which an over-driven ox had been slaughtered, had his tongue and throat swollen a few hours afterwards, and an eruption of blackish pustules over his body. He died in four days. Another person, having wounded himself in the hand with a bone of the same ox, was seized with inflammation of the arm, followed by mortification and death. Two females experienced also gangrenous inflammation from a few drops of the blood of the same animal having fallen upon the hand of one, and on the cheek of the other. Inoculation with, or even the simple contact of, the blood of diseased animals, may produce in men the malignant pustule. Of this numerous proofs have been furnished. MM. DUPUY and LEURET introduced into the cellular tissue and veins of a sound horse, blood taken from a horse affected with malignant carbuncle (pustule maligne), and thus produced the disease. The serious effects also observed to follow wounds in dissection, either of recently dead bodies, or of those in which decomposition has commenced; the changes which take place in the blood, either primarily or secondarily, in various maladies; the septic influence of certain animal secretions and poisons on the tissues to which they are applied, on the blood, and on the frame generally; are among the most important phenomena of disease. I shall, therefore, proceed to a more minute examination of this department of pathology than it has recently received. That these changes are of a most important nature; that they may arise from various causes, or from spontaneous alterations taking place in the blood while circulating in the vessels of the animal, even whilst those changes are so slight as to escape detection by our senses; and that the blood, when thus changed, will be the cause of disease presenting a malignant character, when applied to or inserted into the tissues of healthy animals, are facts which the preceding, as well as other evidence about to be adduced, fully demonstrate. The chief of these changes, to which I attach the utmost importance, having observed them to exist more or less in a large proportion of cases where blood has been removed, or escaped from a vessel, in malignant or adynamic diseases, or in the last stages of very acute and dangerous maladies, are the following:—

93. *a.* The blood has generally a somewhat salt taste in health, evidently depending chiefly upon the quantity of muriate of soda contained in it. In various maladies, particularly those which are malignant, and in the advanced stages of fevers; this taste is not so remarkable, particularly when the blood assumes a darker hue than natural. *b.* The peculiar odour of this fluid upon emission from a vein is also very remarkably changed in these maladies. HALLER has adduced numerous instances of this in his great

work; and various authors—and amongst these, VAN SWIETEN, HOFFMANN, SCHWENCKE, FLUXHAM, LININGS, &c.—have noticed a remarkable factor of the blood in adynamic fevers and pestilential maladies. I have observed a peculiar odour of the blood in cases of malignant puerperal fever. We are informed by LOUIS DE CASTRO, that the blood of two plague patients infected the air of their apartment with a foetid odour; and ZACUTUS mentions, that three persons were struck dead by the odour exhaled from the blood drawn from the vein of a person infected with plague. MURALT also states that a cadaverous factor emanates from the blood of persons affected with this malady; and BAGLIVI mentions that a nearly similar phenomenon was observed in the blood of patients in the advanced stages of a very fatal epidemic fever. HALLER prognosticated a fatal issue, chiefly from this symptom, in a case to which he refers. ZURINUS, ALPRUNNER, and VATER, allude to cases where physicians were dangerously infected by the factor of the blood, upon its abstraction from the veins of persons in malignant and contagious diseases. BOISSEAU states, that he has been very disagreeably affected by the odour of the blood just abstracted from the veins of persons attacked by severe disease of the chest or abdomen. PRINGLE relates, that an individual was seized with dysentery, after inhaling the odour from the blood of a dysenteric patient, kept for a long time. The blood taken from a vein in the arm of a woman in a malignant fever, was, according to MORROU, so offensive, that the surgeon and assistants fainted in consequence. It may be therefore inferred that both the odour and the taste of the human blood may be very sensibly changed in the advanced progress of various adynamic, infectious, and malignant maladies.

94. c. Softness or firmness of the coagulum has been already noticed, in connection with the condition of the fibrine; and stated to be often independent of the quantity of this constituent, and to be chiefly owing to the degree of nervous influence and vascular action. In the class of diseases now alluded to, the coagulum is not only remarkably soft, but, from the want of adhesion, and from the solubility of the colouring matter in the serum, is sometimes readily converted into a reddish fluid by slight agitation with it. In other cases no coagulum forms, the fibrine being suspended in small albuminous-like fragments in the serum, and the colouring matter precipitated to the bottom of the vessel. In several instances, these constituents are not separated from the serum, but seem combined with it; the whole mass remaining more or less fluid, and presenting a reddish, reddish black, or blackish colour, from the time of its emission till it furnishes evidence of decomposition. I have met, in other cases, with the blood changed into two parts: the upper and serous part consisting of a remarkably soft gelatinous mass, sometimes almost fluid, resembling very weak or uncoagulated calves-foot jelly, and forming from two thirds to four fifths of the whole; the colouring matter being spread over the bottom of the vessel, and presenting a dirty, black, and muddy appearance. I have also observed, and very lately, in two cases to which I had been called by neighbouring practitioners, the colouring part of the blood, with a portion of the fibrine and albumen, deposited on the bottom

of the vessel, of a colour between a deep brown and dirty dark grey, the serum being very abundant and turbid.

95. d. Appearances analogous to the above are also observed whilst the blood is in the veins of the dead body. In many cases, it is either fluid or semifluid, treacly, and of a dark colour. In others it is apparently decomposed and grumous; and in some, either consisting of perfectly fluid blood, or resembling water coloured with a reddish brown matter. In some cases, where the blood has been partially coagulated or separated into a grumous state, the more fluid parts, generally in the form of a bloody or sainous serum, have percolated the tissues, and escaped through the relaxed exhaling pores and extremities, and passed into the shut cavities; but more frequently flowed out on the mucous surfaces, leaving the more consistent parts of the blood in the vessels in larger proportion than in health. In all these cases, the blood, whether that drawn from the veins, or found in them after death, seems not so deficient of fibrine, as that its state is changed owing to exhaustion or annihilation of vitality, by virtue of the possession of which (derived from the influence of the organic nerves on the blood-vessels and internal viscera) its fibrous corpuscles are precipitated into a coagulum when removed from the veins.

96. ii. FURTHER DETAILS OF CHANGE IN THE BLOOD, AND ITS RELATION TO PARTICULAR KINDS OF DISEASE.—A. The existence of a buff on blood drawn from a vein has always been remarked by practitioners, as a sign, not only of disease, but also of inflammation. GENDRIN (following the path of his predecessors) asserts, that the blood is in a very inflammatory state, when it coagulates quickly; is covered by a thick, concave, dense, elastic, buff, of a yellowish white; and separates into a truncated, ovoid, dense, elastic clot, floating in a serum, which bears a proportion to it of one and a half or two to one; is slimy, colourless, slightly turbid at the bottom of the vessel, and without any trace of colouring matter. The clot more rarely is of the shape of a truncated cone; is very dense at its surface, pretty soft at its base; does not float; and is more voluminous than the serum, which is of a pale yellow: in this case the blood is more than very inflammatory.

97. He observes that the blood is inflammatory, when the buff is thick, diaphanous, of a dull white, and covers a rather dense cylindrical clot, beneath which is the serum, yellowish, and equal at most to twice the volume of the clot, a slight colouring deposit being found at the bottom of the vessel. If there be any buff when the blood is sub-inflammatory, the clot does not float, but is suspended in the middle of the liquid, or is precipitated, and is less dense than in inflammatory blood; the serum is slightly tinted with red at the bottom of the vessel, where a layer of colouring matter may be seen. But usually there is no buff; the clot is dense, ovoid, floating, and presenting a red stratum on its surface; the serum is viscous, limpid, somewhat turbid at the bottom of the vessel, where no colouring matter can be observed. The blood in this state coagulates quickly, and yields serum of at least twice the volume of the clot. When the proportion of serum is less than twice that of the clot, and the latter is soft, cylindrical, voluminous, although

floating, the blood is *scarcely sub-inflammatory*; it is so in a slight degree, when the clot is dense, oval, and pendent in the middle of the vessel; when, of those two last mentioned coagula, the first occupies the middle, and the second the bottom of the vessel, the blood is *more inflammatory*.

98. This description is tolerably accurate, particularly as respects *inflammations of serous membranes, pneumonia, and other visceral inflammations*, when the circulation is free and the pulse not oppressed. But every one must have observed, that there may be very acute inflammation, and yet the blood is not buffed, particularly in children; and, on the other hand, that this appearance often exists to a greater or less extent in *plethoric persons, in pregnant and puerperal females*, in those who resort frequently to blood-letting, and in *rheumatism*, even in its least inflammatory forms. M. GENDRIN also errs as respects the rapidity with which inflamed blood coagulates. When the powers of life are unimpaired, and the circulation quick, and particularly during acute and general vascular reaction and vital or nervous excitement, coagulation is either longer in taking place, or, if it commences soon, it is much later in being completed than in other cases; but which will depend upon the stream of blood. If this be full, quick, and large, and the temperature of the partment high, coagulation is delayed, and the buff *scarcely* appears. If the stream be small, slow, and the temperature low, coagulation is rapid, and no buff is formed.

99. In some cases of *intense inflammation*, no buff appears, the blood coagulates slowly, the clot is less dense, and less serum is formed than in health; but the coagulum is very distinct from the serum, into which it does not at all dissolve. This, although another condition of the blood in a state of inflammation, is observed also in cases where the inflammation is not excessive, as every practitioner must have had numerous opportunities of ascertaining. Two superimposed layers of buff are sometimes seen — the one soft or friable, the inferior more dense, more compact, — but not (as is asserted) only when suppuration has taken place in an inflamed organ; still less must we receive as a sign of suppuration the dusky white or opacity of this buff, and the presence of a mucous stratum at the bottom of the serum. In short, it does not always happen that the buff shows itself on the blood in chronic phlegmasia, until the subject has become enfeebled, and the nutrition deteriorated. A repetition of bleeding, and a tendency to syncope, causes either a diminution, or the entire disappearance, of the buff. According to PRÉNCIZ, when the blood is not buffed in inflammations, the coagulum is always more firm than natural, — an observation which is tolerably correct in respect of the state of vital power, but not as regards the presence of inflammation. It should not be overlooked, that in many cases of very acute inflammation, particularly in its early stage, the nervous power may be so oppressed, and general vascular action consequently so imperfectly developed, that the coagulum will neither be firm nor exhibit any buff on the first and second blood-lettings; and yet, when this oppression has been removed, a firm and sly coagulum will be formed by the blood subsequently drawn. This is particularly the case when the respiratory func-

tion has been oppressed at the commencement of the attack.

100. Out of four and twenty cases of *peripneumonia* terminating fatally, LOUIS found the blood of nineteen of these patients covered by a buff, which was firm and thick at each bleeding in fourteen cases; soft, and sometimes infiltrated, in the others. It was cupped only in two fifths of the whole number of patients. The buff was absent in only six cases out of fifty-seven, which recovered. It was very thick, and cupped, in twenty-three of them. The blood was covered by only a slight buff in three cases out of five of *hydrocephalus*, softening of the brain, or *apoplexy*; and in another instance of softening of the brain, the blood remained semi-liquid, without clot or buff.

101. In four cases of *scarlatina*, *small pox*, and *measles*, which terminated favourably, the blood was covered by a thin and not very consistent buff; in one case of scarlatina it was firm and thick: of the character in five cases out of seven of *erysipelas* of the face, and in four cases of *angina*, while in a fifth it was soft; in nine tenths of rheumatic patients it was equally firm and thick; in two subjects affected by *zona* it was not present. It was somewhat thick in four cases of *erythema*, where the circulation was considerably accelerated; thin, in four out of fifteen cases of *pulmonary catarrh*. According to GENDRIN, the buff never appears on the blood of variolous patients until after the eruptive fever begins; it is more strongly marked when the inflammation is more intense, and lasts even after desiccation has taken place. When buff appears at the very first, BAGLIVI is of opinion that the eruption will be considerable.

102. *B. Other states of the blood in various diseases.* — M. BOISSEAU states, that he has seen the venous blood of a lively red — now and then of a *clear rosy red* — and spouting in a transparent thread, in patients afflicted with inflammation of the lungs, and sometimes in those with inflamed joints. Among those with *peripneumonia*, but who were otherwise of sound constitution, he has noticed it covered by a *greenish buff*; yet the greater part of these patients recovered after repeated bleedings. In a very fine young girl, who had enjoyed good health, but was attacked by pain in the side in consequence of a chill, the blood was of a *dirty grey*, approaching to violet, and like lees of wine: after this bleeding she suffered no more, although her skin continued yellow for some months. M. BOISSEAU has also seen blood like *turbid wine* in several cases of pulmonary inflammation, which were nevertheless cured, the patient suffering little more in consequence of the unusual appearance in the blood.

103. In fact, the *hemorrhagic blood*, as also that taken from the veins of subjects attacked by inflammation, is not always consistent and buffed; it is sometimes found dissolved, thin, and serous. The latter appearance is, indeed, less common than the former; but sufficiently so to teach us not to attach too much importance to the aspect of the blood in inflammations, and also not to forget that, whatever may be its condition, phlegmasia will develope itself when the causes from which it springs are sufficiently powerful.

104. A *whitish appearance* of the venous blood has been long observed, arising from the presence of white flakes or streaks. This has been ascribed

to various causes; but with greatest truth to the existence in it of a large portion of unassimilated chyle. The separation of the blood into a soft or natural coagulum, and a milky serum, is much more common. This, as well as the foregoing state of the blood, has been imputed to various causes. EMMERT considered that it was owing to a substance analogous to buff. Some have ascribed it to milk; others to albumen; a few pathologists view it as owing to a matter analogous to fibrine; and several, as proceeding from the admixture of liquid fat. HALLER imputed it to liquid chyle. Of these opinions, the two last are the most accurate. There can be no doubt that both the milkiness of the serum, and the whitish streaks observed in venous blood, are owing in a great measure to unassimilated chyle; and the more accurate researches of modern chemists, particularly CHRISTISON, BARINGTON, LE CANU, &c. have detected in this kind of blood an unusual proportion of oily matter. This state of the serum is occasionally met with in various diseases, functional as well as organic; and seems connected with deficient assimilating power. SYDENHAM states, that he observed the blood drawn from a young convalescent to resemble pus, — an appearance probably owing to the great quantity of chyle carried during convalescence into the blood, which had been poor and defective, and to the circumstance of this fluid not having then experienced the process of sanguification. NICOLAS and GUENDEVILLE have noted, that the blood of *diabetic* patients contains an increase of serum, and very little fibrine: this serum contains, according to ROULLO, a saccharine matter; about the thirtieth part of what is found in urine, according to WOLLASTON.

105. During the prevalence of *scurvy* in Admiral Anson's fleet, the blood taken from the veins, after the eruption had appeared, was marked with dark or with vermilion streaks; on first issuing from the veins it was dissolved and very black, but after standing some time it thickened, and assumed a dark colour; no regular separation of its serum took place, and its surface was greenish in several places. When the disease had arrived at its third stage, the blood was as black as ink; and although it was kept several hours in a vessel, its fibrous part precisely resembled wool or hairs floating in a muddy substance. The blood issuing from the mouth, nose, stomach, intestines, or any other part, in the last stage of this malady, was entirely uncomposed, black, or yellowish. It was found after death entirely dissolved in the veins, so that by cutting some branch of a rather large vein, it was possible to empty all the neighbouring branches with which it communicated of the yellowish black fluid they contained. The extravasated blood was of the same nature. In a scorbutic patient, opened by order of CARTIER, the cavities of the heart were stated to have been entirely filled with corrupted blood.

106. In four cases of *scurvy*, ROUPPE has found the right cavities of the heart filled with black and coagulated blood; and a greenish yellow polypus-like matter filling the left cavities of this organ, the aorta, and the pulmonary artery and vein. Amongst the scorbutic subjects opened at Paris in 1699, by POUPART, it was found that in those who had died suddenly, the auricles of the heart were dilated by coagulated blood, the muscles loaded with black and corrupt blood,

and the cellular sub-cutaneous tissue infiltrated by extravasated, black, coagulated, and congealed blood, in some cases, and by red blood in others.

107. BICHAT found in a dead body, instead of venous blood, a greenish sanies, which filled all the divisions of the splenic vein, the trunk of the vena porta, and all its hepatic branches; so that when cutting the liver, he distinguished by the flowing of this sanies all the branches of the vena porta from those of the hepatic vein, which contained blood in a natural state: this body was remarkable for such an excessive obesity, that BICHAT never remembered seeing any thing equal to it. Unfortunately he does not give us the symptoms of the disease of which this person died.

108. According to COYTER, GENDRIN, and many others, a black pulverised-like substance deposits itself at the bottom of the vessel containing blood taken from persons affected with *typhoid*, malignant, and gangrenous diseases; the clot being often either completely dissolved, or not formed at all. I have seen these appearances, and various modifications of them alluded to above (§ 94.), not only in these diseases, but also in *hæmatemesis*, *dysentery*, severe infectious *erysipelas*, *phlebitis*, the dangerous forms of *puerperal* diseases, *puerperal mania*, and in *purpura hæmorrhagica*.

109. Remarkable fluidity of the blood is always observed after death from severe blows on the epigastrium, and from lightning. J. HUNTER states, that he has also found it fluid after death from a violent fit of passion. MORGAGNI observed it in a similar state after death from hunger; and M. AUDOARD relates, that it was uncommonly fluid in a man who died from *coup de soleil*, voiding blood from the mouth and nostrils. In two cases of *hydrophobia* I found the blood black; so fluid in the heart and veins, that it flowed out abundantly from the vessels of the head and neck, presenting an infinite number of oily points or particles on its surface; and, when removed from the vessel, it did not afterwards coagulate. The same appearances were observed in a large proportion of the numerous cases described by M. TROILLET, and other authors on this disease. M. TROILLET states, that in several of his cases, a considerable quantity of gas escaped from the heart and aorta.

110. iii. THE CAUSES OF CHANGES IN THE HEALTHY STATE OF THE BLOOD.—The causes which occasion morbid changes in the state of the blood, are either such as are confined in their operations to individuals, or such as influence whole classes, or the community generally. They may thus be sporadic, endemic, or epidemic. In respect to their mode of operation, they may be arranged, 1st, Into such as vitiate the fluids from which the blood is formed; 2d, Into those which impede the functions of secretion and depuration; 3d, Those putrid or septic matters which contaminate the tissues and fluids to which they are applied, and act chiefly by absorption; 4th, Those which act upon the vascular system, either directly or indirectly, through the nerves which supply it; and, 5th, The passage into the blood of morbid matters formed in the same body that is the seat of disease.

111. A. Of vitiation of the blood by the fluids which form it.—The fluids which supply the waste of the blood are not infrequently vitiated,

and thereby change the state of the circulating mass. The chief sources of this vitiation are hurtful or unwholesome ingesta. Many articles, even of food, will be hurtful when too long continued. The injurious effects of salt provisions on the blood, when exclusively employed, and particularly if depressing causes cooperate with this diet, are evident, and are fully illustrated in the article on SCURVY. The influence of diseased rye, in first changing the condition of the blood, and inducing a state of chronic arteritis, terminating in gangrene of the extremities, is also well known; and the effects of diseased or putrid flesh upon the system have been often noticed, although not always correctly traced to the quarters where the principal changes are produced. M. BERTIN states that a number of negroes in Guadaloupe, having eaten the flesh of some animals dead of an epizooty, were seized with fever, and violent ileus, of which the greater number died; and numerous cases are on record, where persons shut up in besieged towns, having partaken of putrid animal matter, or of the flesh of animals that have died, have been seized with malignant states of disease; and the blood has been found fluid, dissolved, blackish, grumous, &c. upon examination after death. In these, and numerous similar instances, which might be adduced, although the state of the blood has been alluded to in general terms, the information has been deficient in precision, and has been furnished incidentally, the attention of the observer having been directed to other quarters.

112. M. MAGENDIE adduces, in his Journal, the instance of a man, who, after a long use of vegetables in which the oxalates abounded, underwent the operation of lithotomy, and a large oxalate of lime calculus was removed from him. We know that a large proportion of both our mineral and vegetable medicines operate by being absorbed into the circulation (see art. ABSORPTION, &c.); and there is every reason to suppose that various morbid or foreign matters may pass with the chyle into the blood, and modify its condition. The excessive or long continued use of alkalies, or of alkaline salts with excess of base, has the effect of diminishing the cohesion and the viscosity of the blood, and of preventing it from coagulating after it has been removed from the vessels; and while these substances thus, as it were, dissolve, or attenuate this fluid, they also diminish the vital cohesion and tonic contractility of the extreme vessels and of the tissues, and create a disposition to extravasation of blood in the parenchyma of the organs, and to exudation of it from the mucous surfaces. On the other hand, the acids—particularly the mineral acids—turpentine, the superacetate of lead, and all the salts—especially those with excess of acid—have the effect of increasing the healthy crasis of the blood, and of producing an opposite change to that now stated. When used in excess, however, or injected into the veins, they have been conclusively shown to give rise to fibrinous concretions in the vessels, to coagulate the albumen of the blood, to darken its colour, and thus to render it grumous and unfitted for circulation through the minute capillary vessels, particularly those of the lungs. The influence of salted provisions long and exclusively employed, in which the

soda is generally in excess, in attenuating the blood, in preventing its coagulation when removed from the vessels, and in relaxing the soft solids; and the effect of acids in removing these morbid states; are well illustrated by the nature, progress, treatment, and prophylaxis of scurvy.

113. That the nature of the food materially affects the state of the blood is further shown by the general character of the diseases most prevalent in various communities, living chiefly on certain kinds of aliment. The inhabitants of several places in the north of Europe, who live principally on fish, a large proportion of which is usually kept until it has become remarkably stale, or even ammoniacal, from incipient decomposition, who seldom partake of flesh meat unless in a similar state of change, and who dry or smoke both these kinds of food, instead of salting them, are generally subject to diseases which arise from, or are connected with, an impure state, or weak cohesion, of the circulating fluid. It should not, however, be overlooked, that the more complete changes which respiration effects on the blood in cold climates, and the active exercise of the functions of depuration, under the influence of the vital energies, serve to counteract the morbid alterations which this cause would induce. Yet still the prevalence of disorder in these eliminating organs, particularly the mucous and cutaneous surfaces, which preserve the purity of the blood; and the marked disposition, which all febrile diseases evince, in persons thus circumstanced, towards vitiation of the circulating fluid; and the consequently low or adynamic symptoms which characterise their progress and termination; are sufficient indications of a change in the constitution of this fluid. It is worthy of notice, that communities which live in the manner now alluded to, generally employ remarkably acid beverages, usually consisting of the fermented whey of butter-milk, and a fermented farinaceous infusion. I believe that nothing could be used as common drink better calculated than these to counteract the ill effects of their diet on the blood. Besides the acid existing in these beverages, they also contain much carbonic acid gas, which likewise contributes to their wholesome influence on the blood.

114. The effects of living upon much fresh animal food, in increasing the quantity of fibrine, in rendering the blood rich and abundant, and in disposing to inflammatory diseases, are too well known in all their relations to require illustration. But when we consider the influence of various kinds of aliments in modifying the state of the blood, we ought never to overlook that, as its organisation and vital manifestations commence with the chyle, and depend upon the vital condition of the vessels and tissues, and upon the perfect discharge of all the functions which contribute to its formation and purification, the extent of mischief produced by unwholesome food will be commensurate with the deficiency of vital energy, and the imperfection of the various organic functions. A person of a robust constitution, breathing a pure air, and assisting the eliminating functions by regular exercise, will suffer much less, than the debilitated, the indolent, and those placed in unhealthy localities, from either unwholesome food, or from the accidental ingestion of injurious substances. A person thus circumstanced will also suffer less from the habitual

indulgence in too much animal food; but more commonly such indulgence will give rise to a superabundant secretion of uric acid, and favour gravel. In such persons, also, there is reason to suppose that urea, or uric acid, may exist in the blood, and be deposited from it in various parts of the body, particularly the small joints. The uric acid, which becomes thus abundant, is a highly azotised animal principle, obviously formed from the excessive use of food which abounds in azote; and when its appropriate emunctory, the kidneys, fail of carrying it out of the blood, it is secreted in other parts.

115. *B. Imperfect performance of the functions of depuration, a chief cause of morbid states of the blood.*—The evident influence of this class of causes renders it a matter of surprise that it has been so long overlooked in our estimation of the causation of disease. When the facts which have been brought to light by the successful investigation of the animal functors, are duly weighed, and estimated in connection with the sources of impurity to which the circulating fluid is exposed, the importance of assigning a due rank to this kind of morbid agency will become manifest. When we consider the important changes that take place in the lungs—the quantity of carbonaceous fluids constantly discharged through this organ, and of watery vapour loaded with various impurities continually exhaled from its surface, and passing out with the expired air; or the abundant perspiration, sensible as well as insensible, constantly issuing from the cutaneous surface, and holding dissolved in it substances which require to be eliminated from the circulation, owing either to their excess or their foreign and hurtful nature; or the varying state of the urinary secretion, the quantity eliminated, and the changes it manifests from variations of temperature, atmospheric moisture, and especially from the abundance and nature of the ingesta; or the discharges which the female experiences during the greater part of her average duration of life; or the secretions formed by the liver, the internal surface of the bowels, the pancreas, &c. out of elements which, if not combined into these new forms, and destined to ulterior purposes, would become poisonous to the frame, by vitiating the blood; it must be evident that an interruption to any one of these several functions, if not compensated for by the vicarious increase or modification of some others, must be followed by alterations of the quantity, of the quality, of the relative proportion of the constituents, and even of the vitality of this fluid.

116. *a. Under the due dominance of the vital energy of the system—and particularly of that influence exerted by the organic nerves on the great secreting viscera, and on the whole vascular system—no sooner does any substance, which may have been carried into the circulation, or accumulated in it, become injurious, than it is eliminated by the appropriate action of some organ, which often evinces a kind or degree of disorder, either in its actions, or in the state of its secretions, according to the nature of the substance which affects it. Thus, we perceive various substances and kinds of food, even in health, affect the actions and secretions of the kidneys, of the skin, and of the bowels; certain of their constituents becoming sensible in the halitus of the expired*

air, in the perspiration, or in the urine, where they could be transported through the channel of the circulation only. The factor, &c. of the breath, and of the perspiration, &c. consequent upon interruptions of the abdominal secretions, also indicates that impurities have accumulated in the circulation, and that they are being eliminated by means of the lungs and skin. So long as the vital energy is sufficient for the due performance and harmony of the functions, injurious matters are seldom allowed to accumulate in the blood to the extent of vitiating its constitution, without being discharged from it by means of one or more organs; but as soon as this energy languishes, or is depressed by external agents and influences, and the blood is thereby either imperfectly formed, or insufficiently animalised and depurated, some one of its ultimate elements or proximate constituents becomes excessive, and the chief cause of disorder, which terminates either in the removal of the morbid accumulation, or in a train of morbid actions and organic lesions. These very important pathological facts are so fully proved by the history of the most prevalent and serious diseases, and by their terminations and results, and are so perfectly unopposed by accidental or occasional exceptions, that proofs or illustrations of their value and uniformity are superfluous.

117. *Thus it will be seen that, although changes in the secretions and in the blood itself are most influential in the production, perpetuation, and aggravation of disease; yet such changes are prevented, controlled, and even in some cases promoted, by the state of the nervous energy and vital actions of the frame; to which influence they are always more or less subject, unless when the causes of the disorder are so intense, in relation to its state, as entirely to annihilate it, as is occasionally remarked in respect of the most pestilential diseases, and of the operation of some virulent poisons. Thus, also, will it appear, not only that hurtful matters carried into the circulation, and ultimate elements or proximate constituents allowed to accumulate in it, owing to the imperfect performance of some eliminating function, will be removed from it, when the vital influence is sufficient for the task: but that both kinds of injurious agents will, according to their natures, become productive of a vitiated state of the blood, of the secretions formed from it, and even of the various tissues themselves, when the state of vital manifestation, particularly as displayed in the organic nerves, is insufficient to remove them from the frame, or to control their combinations, or to direct them to salutary changes.*

118. *Before leaving this important subject—important in as far as it involves the fundamental doctrines of disease, and points to rational indications of cure—I may briefly illustrate it by a reference to two or three facts, which are of every day occurrence. It has been long known that affections impeding the functions of the lungs are frequently attended with an increased secretion of bile. This I have shown to depend upon the liver being excited to increased action by the carbonaceous and other elements accumulated in the blood, owing to their elimination by the lungs being interrupted; and thus we readily recognise the cause of the frequent complication of biliary disorder with pulmonary disease, particularly in*

some hot countries. In cases, also, where, owing to asphyxia, or to disease, as pestilential cholera, &c., the requisite changes by respiration are not effected in the blood, if recovery take place, the diseased states of the secretions of the liver and bowels indicate that the favourable result has been chiefly owing to the increased performance, under the influence of life, of the functions of these organs. When death occurs from asphyxia, and particularly if it be occasioned by the vapour of charcoal, the black, fluid, or dissolved state of the blood, the presence of yellowish globules like oil, sometimes observed on its surface, and noticed by M. RAYER, sufficiently indicate the changes produced in this fluid, and the influence these changes exert on the chief functions; and if recovery is effected, the evacuations evince that the principal secreting organs have been the means of removing the morbid matters from the blood. A strict enquiry, also, into the changes which precede a favourable termination of the latter stages of malignant diseases, manifestly detects the influence of the secreting and eliminating organs in bringing about this result, and chiefly by their operation, under the influence of life, upon the blood.

119. *b.* That high ranges of temperature occasion very important changes in the state of the blood, had been remarked by several of the ancients, and by some of the best writers of the eighteenth century; but the chief mode of its operation was first pointed out in a thesis written by M. RAYER, 1815. I there showed that increased atmospheric warmth, particularly when accompanied with moisture and miasmatic exhalations, greatly diminish the changes effected during respiration on the blood in the lungs; and that the carbonaceous, and other elements and impurities, are imperfectly discharged from the blood through this channel. I further showed, both in that production, and in my physiological notes, that these materials are partly combined to form bile, thus occasioning an increased as well as vitiated secretion of this fluid, and partly excreted by the mucous surface of the intestinal canal, and by the skin; and that, if the functions of these organs, — the liver, skin, and intestinal mucous surface, — which thus compensate the diminished actions in the lungs, be at all impeded under such circumstances, the elements, which they should have eliminated from the blood, necessarily accumulate in it, and influence the functions of the nerves, ramified on the blood-vessels, and of the principal secreting organs and surfaces, ultimately vitiating the blood and all the soft solids of the body, when the vital energies become depressed or exhausted, and the train of morbid phenomena experiences no change tending to health.

120. Thus, we perceive that, during high ranges of temperature, particularly when the air is loaded with miasmata, and the liver is inactive, the elements of the bile will accumulate in the blood, sometimes even to the extent of giving the countenance a darker or more dusky tint than natural, and the blood will be changed, 1st, by the superabundance of the materials whence bile is secreted; and, 2d, by the passage of this fluid, or of certain of its constituents, into the blood, after its secretion has taken place. In the foregoing manner (§ 119.), I explained the prevalence of biliary disorders, particularly bilious cholera, diarrhoea,

dysentery, increased secretions of bile; and, in warm climates and seasons, and when vegetable and animal miasms are superadded to this influence, the occurrence of fevers of various kinds — remittent or continued, simple or complicated, biliary or malignant, inflammatory or dysenteric, endemic or epidemic, sporadic or pestilential — according to the circumstances of individuals, the kind of locality, the nature, combination, and source of the miasm, and the state of the atmosphere. This doctrine, now many years since contended for, later experience, and the concurrent opinions of more recent observers, have fully confirmed. (See FEVER.)

121. *c.* Several states of disease, which occur in the puerperal state, may be referred to the arrest of the secretions or discharges incidental to it. The secretions from the internal surface of the uterus, and which partly consists of the bloody serum poured into the uterine cavity from the open mouths of the vessels which communicated with the placenta, are not infrequently arrested or impeded. In such cases, the blood does not undergo that salutary depuration which this evacuation occasions; and, consequently, either experiences further disorder, or it creates a disposition in the system to the invasion of other causes of disease. Besides, the fibrinous and albuminous parts of the blood, which are generally in excess during pregnancy, not having been discharged by this route, determine the occurrence of inflammation of the uterus, peritoneum, &c. upon the co-operation of exciting causes. Or, if such causes have produced these diseases, the obstruction or interruption of the secretions and discharges, which is generally thereby occasioned, aggravates the mischief, and the *post mortem* appearances often furnish more or less evidence of the suppression having been concerned in modifying the results; the matters poured out from the diseased parts frequently resembling, or containing constituents of, the secretion which was suppressed. How are we to account for this? We find it demonstrated, that the materials of both bile and urine, owing to obstruction of these secretions, may be mixed with the blood, and give rise to certain well known symptoms. We may, therefore, extend the same principle to suppression of the puerperal secretions; and infer, that the matters which constitute them, having accumulated in, or not been eliminated from, the blood, are discharged along with those effusions of albuminous serum which frequently follow the diseases of this state, even although they may not actually be the causes of these diseases.

122. GRAEFFE of Berlin (*Rev. Méd.* Jan. 1827.) states, that a female, in a favourable state, and suckling her child, experienced a fright on the eighth day after delivery, which occasioned a complete suppression of her milk. Febrile excitement followed, and effusion took place in the peritoneal cavity and cellular tissue. Upon tapping a few weeks afterwards, a bucket of fluid, resembling whey, and exhaling an acidulous odour, was drawn off. Upon being boiled with dilute sulphuric acid, it furnished a substance resembling caseum. When tapped six weeks afterwards, the fluid was of a greenish yellow, and without the least trace of caseum.

123. That changes in the composition or state of the blood are also followed by alterations of

the natural secretions, is fully shown by both physiological and pathological facts. It is not, therefore, unreasonable to suppose, that modifications or changes of morbid secretions will be occasioned by a similar cause. Indeed, alterations of the latter are quite as likely to be the consequence of pathological conditions of the blood, as changes of the former.

124. *d.* In cases, where the functions of the skin, or of the kidneys, are interrupted, not only are the watery parts of the blood frequently increased, but also various irritating matters accumulate in it, unless eliminated by other organs. These excite more or less disturbance of the whole vascular system; and if the cause continues, or is assisted by concurrent causes, the blood itself becomes very evidently changed, in respect both of the state of its crur and of its serum. The effects of obstruction of the bile on the blood, and mediately on the tissues, are sufficiently apparent to the sight; and the actual presence of this fluid in the circulation, or, at least, the peculiar matters which characterise it, has been shown by several modern chemists, and completely demonstrated by the recent researches of MM. PROUVER, ORFILA, GMELIN, and LE CANU. But it is unnecessary to prosecute the subject further, as I consider that the grand pathological inference, *that the interruption or obstruction of any important secreting or eliminating function, if not compensated by the increased or modified action of some other organs, vitates the blood more or less; and, if such vitiation be not soon removed, by the restoration of the function primarily affected, or by the increased exercise of an analogous function, more important changes are produced in the blood, if the energies of life are insufficient to expel the cause of disturbance, to oppose the progress of change, and to excite actions of a salutary tendency.*

125. *e.* ILLUSTRATIONS.—The importance of this conclusion will become still more manifest, if we illustrate it by reference to the pathology of fever, and observe the train of morbid phenomena produced by its causes. These, although modified even still more infinitely than the combination of causes in which they originate, present the following almost unvarying characters and mode of procession:—A person exposed to the miasmata generated from vegetable or animal matter in a state of decay, or from persons affected with fever, inhales such miasmata into the lungs, where they produce a morbid impression on the nerves of organic life, followed by depression of the vital influence: the functions of digestion and secretion languish, and, owing to the imperfect performance of secretion and assimilation, the necessary changes are not fully effected in the blood; and thus irritating or otherwise injurious matters accumulate in it. These phenomena generally proceed gradually, until, owing to the continued and augmented depression of the vital powers throughout the frame, and the increasing change in the state of the blood, marked disorder is occasioned. The vascular system becomes excited by the quantity and the quality of its contents; and, when the vital energies are not too far depressed for its production, the excitement becomes general. The accelerated circulation tends still more to disorder the state of the blood; but it also has the effect, in the majority of cases, of exciting the

organic functions, of restoring the secretions which were impeded or interrupted, and thereby of removing the morbid state of the circulating fluid; after which the return to health is rapid. When, however, salutary reaction of the vascular system is not brought about, owing to the morbid depression of the vital energy, and to changes which had taken place in the blood; or, if reaction occur, but, owing to the state of this fluid, and of the nervous influence to which it is subject, it is irregular, imperfect, or excessive; the vitiation of the blood proceeds; the secretions are also vitiated; the solids affected; one or more vital organs suffer in an especial manner; the energies of life are exhausted; and various organic lesions are induced, having reference to the previous state of the system, the kind of change produced in the blood, and the agencies in operation during the progress of disease.

126. Such is the general procession and character of the morbid phenomena; and we observe in them certain prominent features, by means of which the various species of fever are recognised. They may be briefly stated to be,—1st, The impression of the causes on the nerves of organic life, the depression of their energies, and imperfect performance of all the functions which they influence: 2d, More or less vascular excitement or change in the state of vascular action, and of the circulating fluid: 3d, Predominant predominance of disorder of some one general system, or vital organ: 4th, Consequent exhaustion, with either a gradual restoration of the functions, followed by a return to health; or more marked vitiation of the blood, of the secretions formed from it, and of the solids of the body, often terminating in organic changes, or death.

127. Here we observe three different states of vital action, in each of which the blood generally presents very different appearances. 1st, *The state of depression and invasion of fever*, in which the blood taken from a vein is of a very deep or dark colour; flows with difficulty; frequently occasioning syncope, or great depression upon the loss of a few ounces; and generally coagulates rapidly, and separates into a very dark, large, and soft coagulum, which falls low in the serum—the quantity of which is extremely small in proportion to the clot. Not infrequently the separation is very imperfect, and the coagulum extremely large and soft. 2d, *The state of reaction, or febrile excitement*, in which the blood flows more freely from the vein, and of a brighter colour, occasioning little immediate depression until a more considerable quantity is abstracted; is apparently thinner than natural; coagulates much more slowly, and separates into a somewhat more firm coagulum, than in the former state of disease; and occasionally exhibits a thin fibrinous layer on its surface: in several malignant cases, however, even in this stage, either the separation of serum is very imperfect, consisting chiefly of a deep gelatinous layer, beneath which the colouring matter is deposited in an extremely loose state, and dark colour; or the blood remains imperfectly coagulated, and of a gelatinous consistence. 3d, *The state of exhaustion*, in which the blood generally flows readily; but is uncommonly thin, dissolved or attenuated, and dark coloured; occasions great increase of exhaustion; and either scarcely coagulates, or separates into a remark-

ably loose coagulum, which lies at the bottom of the vessel; the serum varying much as to quantity and colour; being often turbid, clouded, watery, or slightly viscous, and less saline in its taste. Sometimes the coagulum which falls to the bottom of the vessel is so loose, that it appears as a precipitation of the colouring matter, of a very dark colour, and is readily stirred up into the supernatant serum (§94. 106.). In nearly all the cases where I have seen blood taken, either in the state of depression or in that of exhaustion, but particularly in the latter, either little or no fibrine could be collected from the coagulum; or what was obtained was scanty, remarkably loose, and even flocculent, and nearly albuminous. Throughout the progress of typhus, the venous blood is generally watery, and without consistence,—a fact to which my attention was called many years ago by the late Professor HILDBRAND, at Vienna. In the latter stages of typhoid or malignant fevers, it seems nearly altogether deprived of fibrine. In two or three cases, the blood was abstracted in these states chiefly with the view of examining its appearance. But several instances have occurred to me, in which I have found that blood had been drawn, although the nature of the symptoms, and the state of this fluid, equally contraindicated the propriety of the practice.

128. With respect to the *post mortem* appearances of the blood in the vessels, I stated, many years ago, when describing the symptoms and morbid appearances of yellow fever, several cases of which I had an opportunity of examining within five hours after death, in the years 1816 and 1817, that it is generally half dissolved, or fluid and grumous, dark coloured, and speedily undergoes complete decomposition. (*Quarterly Journ. of Foreign Med.* vol. ii. 1820, p. 446.) A similar state of the blood has been noticed by AREJOLA, BAILL, PALLONI, and others, in the epidemic yellow fever of Spain; and more recently by Dr. STEVENS, who has described the appearances of the blood in tropical fevers with greater minuteness than his predecessors, has referred to most important changes of the saline constituents of this fluid, and has fully confirmed some very detailed observations adduced by myself several years previously (*Appendix to M. RICHERAND'S Physiology*, p. 640, *et seq.*), comprising the general results obtained from noting the appearance of the blood in a number of febrile and malignant diseases. Dr. STEVENS states (*Paper read to the College of Physicians in May 1830.*), that the blood, in these fevers, loses its property of coagulating, becomes more fluid, and thin or watery, of a much darker colour, and has its fibrine and saline ingredients exhausted,—changes which I have ascertained to obtain in a greater or less degree in the fevers of this country, particularly in their latter stages, and have described in my lectures since 1825. (See FEVER.)

129. Besides other proofs of the diseased state of the blood in fevers, I may adduce the following:—In those who were victims to malignant fevers, CHIRAC found the blood in the ventricles of the heart, and the vena cava, more or less clotted; and all the ramifications of the vena porta were filled with grumous blood. In those who died of typhus, at Brest, in 1757, the blood was found grumous, unnatural, black, and decomposed, par-

ticularly in the liver. SOULIER observed blackish blood coagulated in the vessels; and extremely fetid black blood in the stomach, of those who fell victims to the plague at Marseilles. LARREY found the blood black and liquid in those who died of the plague in Egypt. After intense fevers, ANDRAL has found the blood contained in the heart, and in the larger arterial and venous vessels, remarkable for its great liquidity, and its black and deep colour: in some subjects it presented a clear rosy tint, and was like water coloured red; some small fibrous grains were then dispersed over the internal surface of the vessels. In one individual, the liquid contained in the larger vessels was no longer really blood, but a matter the colour of wine lees, sanious in some parts, nearly resembling the ill-elaborated fluid contained in unhealthy abscesses.

130. M. BOUILLAUD found, in two or three cases, the blood clear and rosy, after putrid fevers; but it nearly always appeared blacker and more liquid than in its normal state: this alteration varied, from the degree in which the clot was simply flabby, to that in which the blood formed only a blackened and liquid mass, without any trace of clot. This blood, being put into a basin, was brilliant, shining, and full of micaceous specks; in some cases it has been found mixed with purulent matter, or pure pus; at other times it was so altered and disorganised that it resembled a putrid mass. BOUILLAUD justly adds, that in such instances it is not rare to meet with a quantity of gas, more or less considerable, in the circulating canal; and also that, although it be difficult to describe these changes, they should nevertheless be taken into consideration, if we wish to explain satisfactorily the phenomena attendant on putrid fever.

131. The malignant febrile diseases which very frequently attack horses and cattle are always attended with a remarkable alteration of the blood, even early in their progress. These diseases are less frequently met with in this country, than in marshy and warm climates. In some of the most pestilential of those, horses cannot be reared; and when brought into those places, they generally experience a febrile attack, with adynamic or malignant symptoms, and speedily die. This is constantly the case in some parts of Africa, where the vegeto-animal miasms from the soil are abundant and concentrated. I have an opportunity of observing the examination of a horse brought from the interior to an unhealthy situation on the coast, where it died, as all others had done, a few weeks afterwards. It was not much emaciated; but the blood was black, decomposed, fluid, and sanious; and the liver, spleen, lungs, heart, and, indeed, all the internal viscera, softened, ecchymosed, and lacerable with the utmost ease.

132. *C. Contamination of the blood by putrid or septic matters applied to the tissues.*—These substances were not inappropriately said, by the older writers, to occasion a putrid ferment in the part to which they were applied. The ferment may be disputed, but that they produce change of the blood is undeniable. If we examine the subject closely, we can arrive at this conclusion only,—that the substance applied changes the part to a state somewhat similar, as respects sensible properties, to itself; and that this contamination soon extends, either by its immediate effects upon

the organic nerves supplying the vessels, and consecutively on the blood, or by the direct introduction of the contaminating matter into the divided vessels, or by its imbibition or absorption, or by one or more of these channels, to the whole body, affecting, more or less, the blood, the secretions, and the solids. That these changes take place is undeniable, although the precise channel of primary infection cannot be easily demonstrated; and is sufficiently proved by the facts already adduced (§ 92.), and by those which follow (§ 133.). The instances of gangrenous or diffusive inflammation of the cellular tissue, arising from contact or inoculation of putrid animal matter, as recorded by numerous writers, and recently by Drs. BUTTER and DUNCAN; the not infrequent instances of it from injury in the dissecting-room (see *CELLULAR TISSUE, Diffusive Inflammation of*); and the occurrence of putrid fever, with gangrenous pustules and carbuncles, particularly amongst farriers, flayers, and knackers; furnish proofs and illustrations of the blood being one of the chief, although, perhaps, not the primary or only, channel through which the whole frame becomes more or less infected in a large and important class of diseases. A most remarkable instance of this, and at the same time showing to how great an extent the fluids and solids of the body may be contaminated, and yet the patient recover, is recorded by M. GENDRIN.

133. A flayer was affected with putrid fever, and gangrenous pustules and carbuncles. His breath, evacuations, and whole body, were horribly foetid; and blood taken from a vein was, three hours and a half after its emission, unusually dissolved and black; and gave out an odour resembling that of putrid flesh. A spontaneous discharge of a black, dissolved, sanious blood, also occurred from his mouth and nostrils. M. GENDRIN introduced some of the blood taken from the arm of this person into the cellular tissue of a cat, and into the femoral vein of a dog. Both animals evinced symptoms of putrid fever, and died in a few hours. The blood throughout their bodies was dark and fluid; the heart soft and flaccid; the viscera congested, and ecchymosed with dark spots, and speedily began to exhale a foetid odour. M. GENDRIN also details some experiments, in which he injected into the veins of different animals, the blood of persons affected with confluent small pox. Very violent effects, rapidly terminating in death, followed; and, upon inspecting the bodies, several viscera were found highly inflamed and congested.

134. *D. Contamination of the blood from causes influencing the state of the vascular system, either directly, or mediately through the nerves which supply it.*—Under this head may be comprised a very numerous class of causes: and, indeed, many of those which were allu led to in preceding sections may also act in this way. *a.* Infectious and contagious miasms and secretions may change the state of the blood in a more or less direct manner, as well as by first affecting the organic nervous system generally, and thereby impeding or changing the action of vital and secreting organs. Inordinate acceleration of the circulation appears to be frequently followed by serious alterations of the blood. The experiments of M. DUVY on several animals show that the fibrine is either very much diminished, or otherwise changed, by

they being coursed or hunted; as the blood remains fluid, or becomes dark coloured and grumous subsequently: M. CHAUSSEIER found that a portion of blood altered by this cause produced gangrenous pustules and malignant fever, when inserted into the cellular tissue of sound animals; and the striking instance recorded by DUHAMEL, and already alluded to, further proves that a morbid state of the blood is occasioned by over-driving animals. HALLER and BUCHNER remark, that vehement exertion renders the urine foetid, acrid, and scalding; the perspiration foetid and disagreeable; the blood very fluid, acrid, and vitiated; and, if long continued, occasions most ardent fever, terminating rapidly in death, and dissolution of the fluids and solids. HALLER refers to two cases where he observed these effects produced by intense acceleration of the circulation by running; and adds, that the blood of hunted animals is often not only fluid, but foetid; the flesh becoming quickly putrid. The attenuation and subsequent alteration of the blood observed in ardent or other fevers, attended with inordinate vascular action in their early stages, and the ecchymosis, petechiæ, softening of the mucous tissues, &c. may doubtless be attributed, in part, to the rapidity of the circulation, or increased motion to which it is subjected. If we continue to agitate healthy blood as it flows from a vein, it becomes thinner than natural, a small portion of fibrine collects at and the stick with which it is stirred, and the blood remains fluid, as must be familiar to every one, and long since demonstrated by SCHWENCKE.

135. *b.* If any of the neutral alkaline salts, particularly those with excess of base, be added to blood as it is discharged, the coagulation will either be entirely prevented, or imperfectly produced; little or no fibrine will be formed, and its colour will become more florid. These facts have long since been noticed by VERRIEN, ELLER, RUTTY, HALLER, &c. The injection of acids, or the metallic salts, particularly those with any excess of acid, render the blood dark coloured, and changes it into a grumous fluid, from partially coagulating its albumen and fibrine. The experiments of ELLER, GIANILIA, DUHAMEL, FRIEND, COURTEN, RUTTY, DE HEYDE, SPROGEL, AALST, BORNICH, PELTIT, and various others, prove this effect; and further show, that when these substances are added to blood taken from they either accelerate its coagulation, rendering the coagulum firm; or, if strong solutions are employed, the coagulation is irregular, the separation of the watery portion is more perfect, and the coagula are of a dirty black or dark brown colour. The attenuating effects of the fixed and volatile alkalies, and of their subcarbonates, both upon the blood and the secretions formed from it, particularly when long employed, will be considered as proved by any one who will peruse the experiments of SCHWENCKE, FRIEND, ELLER, RUTTY, COURTEN, PITCAIRNE, THACKRAH, and SCUDAMORE, without the bias of system; and they are confirmed in my mind by some observations I have made of the results when these substances are mixed with blood immediately after venæsection, or when exhibited internally in large doses for some time previous to abstraction of the blood; whilst directly opposite effects are observed to follow the internal use of acids. In the

latter case, the coagulum is firm, the blood of a deep or dark colour, and the fibrine abundant: in the former, the blood is thin, of a brighter colour, the coagulum much less firm, and the quantity as well as the cohesion of the fibrine diminished.

136. The effect of the fluid extract or tincture of opium, alcohol, tonic or astringent tinctures, and of spirits of turpentine upon the blood, is to increase its coagulability; and, when injected into the veins in sufficient quantity, to produce death, as in similar experiments with acids and the metallic salts, chiefly from this mode of operation. The experiments of COURLEN, FRIEND, YOUNGE, SCHWENCKE, DE HUYDE, SPROEGEL, SILBERLING, and FONTANA, fully prove these facts. The accuracy of the results as to one of these substances has been confirmed by the experiments of the writer. That both alkalies, acids, and salts, act upon the system chiefly from their being absorbed and carried into the blood, has been satisfactorily demonstrated by MAGENDIE, TIRDEMANN and GUELIN, MAYER, WESERUM, and various others, and will not be now doubted, although the active exercise of the eliminating functions, which their very pre-ence in the blood generally promotes, prevents their accumulation there to any considerable or deleterious extent, unless they have been taken in poisonous doses. They have, nevertheless, been absorbed in such quantity as to be detected both in the blood and in the various secretions by means of chemical agents, as demonstrated by MM. GROGNIF, CHAUSSIER, ORFILA, and by BUCHNER, KRINER, BENNERSCHILDT, SCHUBARTH, and Dr. O'SHAUGHNESSY.

137. c. The interesting researches of MM. GASPARD and MAGENDIE, in order to ascertain the effects of *putrid vegetable and animal matter* when introduced into the cellular tissue or injected into the blood, further illustrate the importance that is to be attached to morbid states of this fluid, as well as the origin and nature of various diseases. These physicians have fully proved that such substances, when thus employed, produce symptoms very similar to those of yellow fever, and typhus; and that, after death, this fluid is found remarkably altered, being nearly altogether fluid, of a very dark colour, and partially exuded from the capillaries, both into the parenchyma of the viscera, and from the mucous surfaces. That the blood is really altered in its nature by this inoculation, is proved not only by those changes, but also by the circumstance of its having lost the power of coagulating upon removal from a vein soon after it has been thus infected, and by its speedy putrefaction. The more recent experiments of M. M. LEURET and HAMONT furnish the like results; whilst those performed by M. MAGENDIE show that dogs confined over, and breathing the effluvia proceeding from, animal and vegetable matters undergoing decay, experience similar symptoms to those now referred to, and the same alterations of the blood, of the secretions, of the excretions, and of the viscera, as observed in yellow fever: and, in all these cases, the morbid changes also extend more or less to the soft solids, and particularly to the mucous surfaces, the lungs, the liver, the heart, &c.

138. A most interesting fact has been stated by M. LEURET, and one which fully illustrates

the views I have entertained respecting the nature of certain forms of *puerperal fever*. This physician injected some blood from an artery of a living horse affected with gangrenous boils (*pustule maligne*) directly into the veins of a mare five months' with foal. She died five days afterwards. The heart, lungs, and intestinal canal were studded with dark ecchymoses, the uterus was gangrenous, and the blood dissolved and dark coloured. But, in all the cases where poisoning has resulted from the injection of septic or putrid matters into the circulation, or from virulent and rapidly fatal poisons, it must not be overlooked that, although the more manifest lesions are often observed in the blood, the injurious agent affects also the organic nerves terminating in the vessels, and consequently the vitality of the vessels themselves, altering the blood they contain, and thereby ultimately contaminating all the secretions and fluids of the body; and that the mode of operation of the greater number of these septic agents, whether applied in an aggregate or palpable form, or from being dissolved in the moisture of the air, is very different from that of the saline and mineral substances considered above, which affect the blood more especially. (See INFECTION.)

139. d. The direct influence of the nervous system upon the blood was long since contended for by BARNIZ, and admitted by several physiologists. The chief error, or rather mischievous fallacy in their theory, however, being, that this influence was imputed to the cerebro-spinal nerves, and not to the ganglial nerves, to which it almost entirely belongs. This great mistake also vitiates the opinions promulgated on the subject by Mr. BRIDIE and Dr. W. PHILLIP. The opinions, which I have entertained, and frequently expressed, that the power exerted by the nervous system on the blood is limited to the organic or ganglial class of nerves, and that their functions are very distinct from those performed by the cerebro-spinal class of nerves, the influence of the former having been too generally and erroneously imputed to the latter, have been already alluded to. Since their promulgation many years ago, numerous proofs of the accuracy of these views have been furnished in different countries. That the effects produced by the organic nerves take place chiefly in the minute vessels may be safely assumed; and that a reciprocative influence is exerted by the blood upon these nerves will not be denied: but it may also be inferred that the effects produced by the organic nerves are not limited to the small vessels. Professor MAYER's experiments support this opinion. He found that, when both pneumogastric nerves were tied, the blood coagulated in all the pulmonary vessels, the colouring matter having separated from the fibrine; and that this change was not the consequence of death, but its antecedent, since it was uniformly found upon opening the bodies the moment they expired. M. DUPUYTREN had previously ascertained, that a simple division of the pneumogastric nerve prevented the venous from being converted into arterial blood in the lungs.

140. M. DUPUY found that, when the pneumogastric nerves were divided in the cervical region, in horses, the quantity of fibrine in the blood became progressively diminished to a very

remarkable extent; and that a similar result followed laborious breathing in disease. He further states, that the blood throughout the animal was entirely dissolved after the pneumogastric nerves had been divided; and he adds that, when a portion of this blood is injected into the jugular vein of another horse, a gangrenous affection is produced (§ 92.). But these effects are comparatively slow; for in order that they may take place, the division of these nerves must previously affect the ganglia and plexi supplying the lungs and heart, and with which they are in intimate connection. When, however, these ganglia are immediately impressed, the effect is much more rapid. Such impression cannot, however, be readily made upon the ganglia themselves, owing to the protection their situation affords them from experiments of a conclusive kind. But as we find that agents, which do not affect the system when applied to the voluntary nerves, or the brain itself, will act rapidly when brought in contact with parts which are especially provided with the other class of nerves, and manifest the effects of this mode of operation upon the parts more immediately influenced from this source, we must necessarily conclude that the morbid impression of poisonous substances is primarily exerted upon the latter, and not upon the former; and hence the rapidity of their effects upon the blood, — effects which are productive, no doubt, of most important consequences throughout the economy, which I am endeavouring to estimate fully and fairly, but which should not altogether obscure our perception of earlier changes, which alone can account for all the phenomena. A severe blow over the celiac ganglion will produce instant death, and the blood will remain dissolved, and exhibit the same appearances as after death by lightning and the most virulent poisons. Here we can attribute these remarkable changes only to the sudden concussion, and annihilation of the influence exerted by this important part of the organic or ganglial class of nerves — by this central source of vital power, upon the vascular system, and to the effect thereby produced upon the blood.

141. Seeing, therefore, that the organic or ganglial nerves are chiefly distributed to the very internal membrane of the blood-vessels for the purpose of transmitting their vital influence to the blood itself, it must be inferred that, although various substances or poisons may seem to act more particularly and immediately upon the blood, and others more directly on this class of nerves, according as they are applied within or without the vessels, the action cannot be restricted to either; for whatever changes the state of the one, must affect the other. That poisons, when introduced into the blood, will have an almost instantaneous effect, but not in the manner usually explained, may be readily granted and accounted for. The view stated by the story, and in his accordance with are moreover confirmed by recent observations. When poison has been applied to the cerebro-spinal nerves, it has been found by ORFILA, FONTANA, and others, to have no further operation, or even less, than when applied to other tissues, because

it is not directed to that particular organisation, upon which the functions of life more immediately depend. But when injected into the blood, it is applied to the terminations of the organic nerves in the blood-vessels — to that particular quarter where the life of the tissues and of the blood is either generated or supplied, — to the seat where the influence of these nerves affects, even if it does not vitalise, the circulating fluid, and the operation is instant and most manifest. The reader, who, possessing an intimate acquaintance with the healthy relations of the organic nerves to the blood-vessels on the one hand, and to the cerebro-spinal system on the other, examines the numerous experiments which have been performed, — by one class of experimenters to show the action of poisons upon the nerves, confounding, as all have done, the ganglial with the cerebro-spinal nerves, — and by another class to demonstrate the operation of these substances on the blood solely, both sides leaving reciprocity of action, or rather the rapid change occasioned by one system on the other, too much out of the question; and is able to detect the fallacies with which they nearly all more or less abound, chiefly from confounding distinct functions, and even different systems, with one another: will entertain but few doubts, that the influence of various poisons, although more manifestly indicated in the blood, is chiefly exerted upon the nerves which terminate in the blood-vessels; and that the alterations in the contents of the vessels arise principally from previous changes produced upon these nerves, however rapid the succession of the phenomena may be.

142. The celebrated and accurate experiments made by FONTANA on the venom of the viper and the ticunas can be justly estimated only in accordance with this view; for when these substances were applied to the cerebro-spinal nerves no more rapid effect was produced by them than upon any other tissue: but, when injected into the veins, a fatal result was almost instantaneous; the blood, in the words of this able experimenter, being suddenly changed to a livid black, and soon afterwards coagulated in the lungs, heart, auricles, and liver, as well as in the large veins, with violent disease of the structure of the lungs. Now, as these substances, when added to blood as it is drawn from a vein, preserve its fluidity, they must produce, on the organic nerves ramified to the blood-vessels, a most intense effect; the alteration in the blood resulting evidently from antecedent change in the vital influence of these nerves, since no such alteration is occasioned by them when added, even much more abundantly, to blood as it flows from a vein. And there can be no doubt that virulent poisons introduced into, or having access to, blood contained in the vessels of a living animal, however the vessel may be insulated from surrounding nerves, must come in contact with its interior, and thus have an occasion given them to act upon the independent class of nerves which is especially devoted to the blood-vessels. That the very instant and intense effects which I have, in three instances, seen produced upon the blood of the human subject from the bites of serpents, and which have been minutely described by ORFILA, FONTANA, and many others, cannot arise from the diffusion of the poison in the blood, must be evident from the rapidity with which they occur, but

from the morbid impression made by them upon the vital or ganglionic nerves, and instantly propagated throughout the frame; the effects of this impression first appearing as a manifest lesion in the part where the injury was inflicted, and in the blood, which, as a part of the vascular system, is co-ordinately affected with the class of nerves supplying both it, and the vessels which contain it, with vital influence. From the mode of operation, therefore, of all the most virulent poisons, as prussic acid, the venom of the viper, tunicas, &c., I infer, that, as the organic system of nerves may be intensely affected, without altering the state of the brain more than that of any other important organ, and then secondarily merely, so may those poisons destroy life by their effects upon this system of nerves primarily and chiefly, other lesions being consecutive, amongst which the alteration of the blood is the next most immediate, and the next most important in its relations and consequences. (See POISONS.)

143. *E. The passage into the blood of morbid matters formed in the same body that is the seat of disease*, has been particularly noticed in the articles on *Absorption and Inflammation of Veins*. I have shown, when treating of these subjects, as well as of certain organic and malignant diseases, that vitiation of the blood, and ultimately of the soft solids more or less, is a very frequent occurrence; that it is hastened, &c. promoted by depression of the vital energies; and that this fact, as well as the vitiation of the blood, should be taken into account in treating the maladies, particularly in their more advanced stages. It is probable that morbid matters may sometimes exist in the blood without very materially affecting its condition; but they much more frequently occasion very important changes in its constitution, as must appear from what has been stated, particularly when the powers of life begin to languish. Pus has been often detected in the veins which convey blood from parts undergoing the suppurative process, both by the older physicians and by recent writers, particularly BICHAT, FIZEAU, VELPEAU, ROCHOUX, GENDRIN, ANDRAL, DANCE, BRESCHET, and RUIJS; and it seems very probable that, when thus absorbed, and not mixed with, or eliminated from, the circulation, it gives rise to various changes of the blood in the vessels, not only from attracting the fibrinous corpuscles in the manner already noticed (§ 85.), but also from combining with albuminous or other constituents of this fluid. I further believe, that the sanies which flows from chronic ulcers, or from the inside of veins when affected with spreading inflammation of their internal surface (see VEINS.), and from the internal surface of the uterus in certain states of puerperal disease; and that the tubercular and encephaloid matter which often forms in internal viscera; may all be carried into, and most sensibly affect, the circulating fluid, and, through it, all the functions and structures of the body.

144. M. ANDRAL states, that he has often found in the blood-vessels, instead of blood, a curdy friable matter, of a dirty grey colour, and resembling either the semi-concrete pus of chronic abscesses, or the sanies of malignant ulcers, or encephaloid matter broken down and mixed with blood; and similar instances are recorded by BICHAT, BÉCLARD, and VELPEAU. In all these

cases, abscesses, tubercles, or other morbid formations, also existed in some part of the body. (See arts. ABSORPTION, ANSCISS, &c.) In many of such cases, it is difficult to determine what may have been the state of the general mass of blood in the latter stages of the disease, owing to the period which had elapsed from the dissolution of the patient to the examination; but it is very probable that the morbid matter found in the vessels had materially affected, either directly, or mediately through the organic nerves, the constitution of the whole fluids and soft solids of the body.

145. iv. PHENOMENA MATERIALLY DEPENDING UPON A VITIATED STATE OF THE BLOOD, AND SERVING TO INDICATE ITS EXISTENCE. — I have contended that the functions of depuration are very frequently concerned in occasioning, as well as in removing, a morbid condition of the circulating fluid. These functions will, therefore, evidently present some modification, when performing this latter purpose, inasmuch as the state of the blood, and of the impurities requiring change and elimination, will excite in them, as well as throughout the soft solids, more or less disturbance. In the slighter cases, the disorder of function will be less apparent; but even in these, and still more remarkably in the more severe cases, the particular function most disturbed will generally evince some relation to the kind of change existing in the blood. This relation of the change or impurity of the blood to the functions of viscera is very similar to the mode of operation and effects of very many medicinal substances, which, having been carried into the circulation by the function of absorption, act upon particular organs according to the circumstance of their exciting or otherwise changing the vital condition of these organs, while they are being circulated through or eliminated by them.

146. As respects, however, this relation of the pathological states of the blood, much requires to be ascertained, or rather but little is yet known beyond a few facts evincing that such relation sometimes actually exists. Thus we observe that excess of carbonaceous elements in the blood is removed chiefly by means of the liver, occasioning an abundant and vitiated secretion of bile. We may frequently remark, that an imperfectly elaborated chyle, or the partial absorption of sordes from the intestinal canal, renders the breath fetid, and the urine loaded, or otherwise changed; that accumulation of the materials usually eliminated by the kidneys produces copious urinous perspirations, and the exhalation of a copious fetid halitus from the lungs; and that putrid vegetable and animal matters, or morbid secretions carried into the circulation, derange the digestive mucous surface, and secreting organs, in a somewhat greater degree than other parts.

147. A. It obviously becomes most important to enquire if the phenomena resulting from change in the blood slowly brought about, or proceeding from pre-existing disease of important functions are different from, or are nearly the same as, those which arise from the introduction of putrid or morbid matters directly into the circulation. We observe in the last stages of malignant diseases, when the blood undoubtedly becomes changed, that all the secretions are remarkably offensive, acid, and even excoりiating. The breath, per-

spiration, urine, and stools, are foetid; and the surfaces and parts with which the secretions and excretions come in contact, experience more or less change in their vital actions, and are disposed to undergo rapid disorganisation. All the circulating and secreted fluids have acquired septic and irritating properties; and discharges of sanguineous, or black, grumous, fluid matters sometimes take place from the digestive canal. The whole soft solids also lose their vital cohesion and tonic contractility, and are rapidly destroyed upon accidental injury and pressure. Hence the frequency and severity of the excoriations, ulcers, and sphacelating sores, which affect the prominent parts, sustaining the weight of the body in bed; and to this cause, in some measure, are to be imputed the ill effects sometimes following the use of blisters in the last stages of adynamic diseases. The whole surface of the body and countenance also present more or less of the characters which distinguish change of the other structures from this all-pervading cause: they lose their vital and animated hue, and become lurid, murky, or of a dirty pale tint; in some cases of a dirty or muddled pale yellow; in others slightly livid, or even altogether purplish; and in many instances, besides assuming a lurid and unhealthy colour, they are dotted with petechiæ, ecchymoses, and blotches of various shades, from reddish tint to a reddish brown and deep purple. In numerous cases, particularly in the last stages of yellow fever, the skin is of different shades of yellow, frequently disposed in large patches, some of which are deeper than others, but the whole surface being more or less changed from its healthy tint. All these appearances arise from the state of the colourless parts of the blood, transmitted by the minute vessels of the integuments; and the admission, where ecchymosis, &c. occur, of colouring matter into vessels which did not circulate red blood in health, and the extravasation or escape of minute portions of a reddish serum, or attenuated or semi-dissolved blood, from the pores or extremities of the capillaries of the *rete mucosum*, — a change, however, which is not limited to the teguments, but which often exists still more remarkably in the mucous and submucous surfaces, and parenchymatous organs. (§ 149.)

148. *B.* The rapid or direct introduction of vegetable or animal putrid matter, purulent sanies, or animal poisons, into the circulation, generally occasions, not only change in the blood, destroying its property of coagulating, and imparting to it a tendency to quick decomposition, but also most intense disease of the principal organs: — *a.* The nervous centres are remarkably impressed, giving rise to great prostration of strength, delirium, convulsions, or death, according to the intensity of the cause: — *b.* The digestive organs are affected by vomiting of morbid, brown, grumous, or other fluids; with purging of sanguineous, dark, putrid, or black matters; or distended with foetid gaseous secretions: — *c.* The respiratory and circulating functions are remarkably deranged — the respiration is quick, difficult, or panting; the action of the heart quick, weak, or fluttering, and the impulse deficient; and the pulse, at first full, open, broad, and unusually soft and compressible, soon becomes uncommonly quick, weak, and ultimately small,

thready, or fluttering: — *d.* General disease of all the functions and soft solids, accompanied with speedy death when the cause is intense; but, with the symptoms of adynamic, typhoid, or putrid fever, when acting more slowly, or to a less extent, and occasioning sphacelation or gangrene of various parts, gaseous exhalations or secretions, and various serous, sanguineous, or sanious exhalations and infiltrations.

149. *C.* The effects upon the fluids and soft solids have been already mentioned incidentally, and may, indeed, be inferred from what has been stated. These chiefly consist, *a.* Of a foetid, decomposed, remarkably morbid, acrid, and dark or unnatural colour of all the secreted fluids: *b.* Of diminished cohesion of the tissues generally, but most remarkably of the mucous, cellular, muscular, and glandular parts, — the heart is soft and flaccid, the blood dissolved, and the internal surface of the heart and blood-vessels tinged of a more or less deep red colour, owing, as M. TROUSSEAU has fully proved, to the altered state of the blood; the muscles are easily torn, the mucous and cellular tissues are soft and pulpy; all the structures have lost their vital and physical elasticity, and they all undergo decomposition more rapidly than usual: *c.* Congestions, infiltrations, extravasation, &c. of fluid dark blood into the parenchyma of the lungs, liver, kidneys, and into the cellular, mucous, muscular, and other parts, with gangrenous spots, and a foetid odour.

150. Such are the consequences of putrid or morbid matters conveyed into the circulation, and the results, in respect both of the phenomena, and of the remote organic lesions, of changes produced by these matters in the constitution of the whole fluids and structures of the body. When these matters are in a less concentrated state, or enter the circulation in a more gradual manner, they will then act in a relatively slower and less intense form, and their effects will more nearly approach those described as consequent upon a diseased state of the blood in malignant fevers (§ 125—130.). Yet their operation will still retain nearly the same distinctive characters, the symptoms varying chiefly in degree, but not materially in kind, unless the nature of the cause has also varied. Whether we contemplate, therefore, the character and progress of the phenomena following infection of the blood from these various sources, or the nature of the lesions which ultimately result, we shall be equally struck by the marked similarity existing between them.

151. That the blood is changed in various other maladies, although to a much less extent, may be inferred from the phenomena which are observed either essentially or contingently in their course. The secondary fever in small pox is apparently connected with the partial absorption or the more fluid parts of the matter contained in the pustules, and the change thereby produced on the blood, and through it upon the economy. Instances have come before me, where, upon the rapid disappearance of the small pox eruption, purulent matter was secreted suddenly and in large quantity in the capsules of the joints, and without any previous or coexistent inflammation of these parts. In such cases the purulent matter had evidently passed through the current of the circulation. (See ABSCESS — Consecutive, and ABSORPTION.) Similar occurrences are not un-

frequent in cases of inflammation of veins, and in puerperal metritis. (See VEINS, &c.)

152. v. THERAPEUTICAL INDICATIONS AND MEASURES IN DISEASED STATES OF THE BLOOD.—The facts and observations now adduced in illustration of the pathology of the blood must appear sufficient to attract greater attention to the state of this fluid in the treatment of diseases, than has been directed to it in modern times. However scanty well ascertained facts connected with this subject may seem, they are at least sufficient to justify us in directing our means of cure to the removal of those changes which may be presumed to exist in this fluid. This indication is the more safely entertained, as those means are often at the same time the most efficacious in removing pre-existing or concomitant disorder of the nervous or other systems of the frame. And it should not be overlooked, in our anticipations of the benefit resulting from curative indications founded on these views, that the most certainly beneficial means of prevention and cure of a most dangerous disease admitted to depend chiefly on the blood, viz. scurvy, is a remedy which acts principally on this fluid, — the citric acid.

153. There are certain facts, which a review of the foregoing observations will lead us to entertain as useful data for our guide, both in the recognition of changes in the blood, and in devising means for their treatment. It will be apparent from what has been adduced, that remarkable diminution or exhaustion of the vital manifestations of organic nerves, or of the vital energy generally, renders the blood dark coloured, prevents its fibrinous particles from adhering into a coagulum when removed from the vessels, disposes the colouring matter to separate from their central corpuscles, and occasions a diminution of its saline ingredients. The effects of various matters, vegetable, animal, and mineral, when gradually and circuitously conveyed, or directly introduced, into the blood, have been particularly described, not merely as evidence of the very important changes produced by them on this fluid, but also as furnishing indications for the removal of similar alterations, when they are the results, immediate or remote, of diseased actions.

154. A. Treatment of blood abounding with fibrinous and albuminous constituents — of buffy blood, &c. — In various diseases, particularly those which are inflammatory, in the early stages of the exanthemata, especially in certain epidemic occurrences of these maladies, the blood abounds in these constituents; and hence partly the copious albuminous and fibro-albuminous exudations which are thrown out by the blood-vessels in their progress. The knowledge, which we have already obtained as to the effects of certain substances on the blood, indicates the propriety of having recourse to such as possess the property of diluting and attenuating these constituents, at the same time that they diminish the vascular action which is instrumental in secreting them; and experience fully proves, by its success, the propriety of the treatment. Blood-letting, and afterwards the free use of diluents holding in solution the alkaline carbonates and salts, more particularly cream of tartar and borax, or the tartarized antimony; and digitalis, large doses of calomel, or other substances which have been shown to produce an attenuating effect

upon the blood, are especially indicated. Blood-letting in those cases is of the utmost service, as it diminishes general action, and removes a portion of the fibrine and albumen which are replaced by the thinner fluids absorbed from the prima via and tissues.

155. B. Treatment of blood with a loose coagululum, &c. — Rapid coagulation and deficient adhesion of the clot have been shown to arise from weak nervous influence and vascular action; and indicate the propriety of having recourse to stimulating tonics, particularly when the smallness of the coagululum, and whey-like, milky, or turbid state of the serum, evince a poor and imperfectly elaborated blood. In this case, chalybeates, the sulphate of quinine, and the more permanent tonics, with the mineral acids, and the metallic salts, are especially required. When, in addition to this state, the blood is of a very dark colour, the combination of stimulants with tonics and the alkaline salts, especially the chlorides of potash or soda, will be found most advantageous. In cases of this description, however, the preparations of ammonia, excepting the muriate and acetate of ammonia, although stimulating, will not be found so serviceable as other saline preparations. When, however, the muriate and acetate of ammonia are combined with excess of acid, the use of them will be advantageous. Camphor, serpentry, and arnica, the essential oils, the turpentine and balsams, are all beneficial in this state of the circulating fluid.

156. C. The treatment in other morbid states of the blood will necessarily vary according to the particular appearances it may present. — a. When the blood coagulates imperfectly, is dark coloured, is readily decomposed, or is thin and dissolved as in scurvy, and various malignant and adynamic diseases, especially when the vital cohesion of the tissues is also impaired, the use of most of the remedies recommended above (§ 155.), particularly the chlorides, the preparations of bark, antiseptic wines, the oil of turpentine, camphor, the chloric and muriatic acids, with vegetable tonics, the nitro-muriatic acid, vinegar, citric acid, &c. The influence of acids in restoring the state of the blood, particularly when morbidly attenuated, and deficient in fibrine, appears to have been well known to the ancients, and the indications thereby offered put in practice. Vinegar was adopted by the Carthaginians and Romans in all their campaigns as the chief beverage, as may be gathered from VIRGIL, MARTIAL, PLINY, GALEN, &c.; and its advantages have been adverted to in modern times by JINNEUS. There cannot be a doubt that both it and citric acid are particularly serviceable in preventing the attenuation, and tendency to dissolution, of the blood generated, as has been shown, by excessive fatigue and exertion, — causes which have often been proved (§ 134.) powerfully to concur with unwholesome food, and vegeto-animal miasms, in the production of scurvy, dysentery, and typhoid fevers. It appears that the scurvy, which was found so destructive in Admiral Anson's fleet, was in no small degree promoted by the excessive labour of the men at the pumps, — a species of exertion which tends more than any other to accelerate the circulation, and exhaust nervous power, and consequently to produce a dissolved and incoagulable state of the blood, and to dimi-

nish its fibrine. When, however, the blood is morbidly thick and carbonaceous, when the respiratory functions are imperfectly performed, and when there appears to be a deficiency of saline constituents in the blood, as in the advanced stages of fevers, the fixed alkaline salts, and chlorides, are much to be preferred to acids.

157. *b.* Since the general neglect into which the humoral pathology has fallen, *antiseptics* have almost been discarded from practice; at least, medicines have seldom or ever been given with an intention of preventing a tendency in the fluids and solids to dissolution. It must have been long known to every person who considered attentively the operation of remedies on the frame, that many of them, either directly or indirectly, produce this effect, in conjunction with other operations; and that they act in this manner, 1st, by exciting the organic nerves, and increasing the vital cohesion of the tissues, to which they are immediately applied; and, 2dly, by their passage, to a greater or less extent, into the circulation, and operation on the blood itself, and, through its medium, on the nerves supplying the vascular system, and on the structures generally, — the antiseptic effect being the sum of those actions. Amongst the various antiseptic remedies with which we are acquainted, there is none more energetic than the chlorides or chlorurets, the spirit of turpentine, camphor, the barks, mineral and vegetable acids, the spices and aromatics, metallic, earthy, and alkaline salts, spirits, and balsams; and observation has proved to us, that these are actually the means which, when appropriately employed, are most successful in removing morbid states of the blood, secretions, and solids. NEEDHAM and PAULER found salt most successful in combating an epizooty characterised by a morbid state of the blood; and I had an opportunity of ascertaining that, without a necessary supply of this substance, the natives of the more insalubrious districts in intertropical Africa are carried off in great numbers by a putrid and liquescent dysentery, for which salt, lime-juice, and cayenne pepper are their principal means of cure. It should, however, be remembered, that all stimulants are not also antiseptic in their operation on the blood. The preparations of ammonia have even an opposite effect, unless the muriate combined with an excess of acid.

158. *c.* During the treatment of all diseases in which the blood becomes more or less changed, it will be requisite to have strict reference to the causes from which the change has arisen. Unwholesome food, vegeto-animal miasms, imperfect secretion and depuration, and deficient nervous and vital power, have been shown to be the chief of these. That the first and second of these should be avoided, need not be stated; and that the secreting and eliminating functions ought to be promoted, in order to purify the blood, is equally manifest. The nervous and vital energies must be not only supported, but also promoted and excited, in order that the power of secretion may be afforded to the torpid and weakened viscera; and that the crasis and vital condition of the blood may be thereby restored, and the tonicity of the capillaries, and of the tissues generally, be increased. In addition to these, also, morbid secretions should be frequently evacuated, in order that vital power may not be further reduced by

their morbid impression on the nerves and mucous digestive surface, and that the possibility of the absorption of any part of them into the circulation may be thereby avoided. But, in carrying this indication into execution, care ought to be had as to the measures which we employ. Gentle means are generally requisite, as rhubarb, &c. But those substances, which, with an aperient operation, possess also a stimulating and antiseptic operation, as the oil of turpentine, should be selected; or, if other substances be preferred, they should be combined with tonics, antiseptics, and stimulants. Formulæ 266. 437. 572. in the *Appendix*, are good examples of this combination.

159. *d.* In all the alterations of the blood resulting from the introduction or absorption of morbid matters from parts previously diseased, whatever tends to lower nervous and vital power, or to promote absorption — more particularly blood-letting, which operates in both these ways — ought to be guarded against, and a diametrically opposite plan of cure adopted; not neglecting at the same time the promotion of the depurative and excreting functions.

160. *e.* In diseases where it seems evident that the watery and saline parts of the blood are drained off, by the continual exhalations from the mucous surfaces, as in cholera, particularly epidemic cholera, diarrhoea and dysentery attended by dangerous symptoms, much advantage might accrue from the injection of warm water into the veins, holding a very small proportion of saline matter, particularly the muriate and carbonate of soda, with a minute quantity of some mild stimulant and astringent, in solution; care being taken that the latter ingredient be not in nearly such quantity as to affect the albumen of the blood. Spirit of wine, ammonia, sulphate of quinine, &c. may be thus employed. (See *Possess*, for treatment of Poisoning of the Blood.)

161. *D. Prophylaxis, or the prevention of morbid states of the blood.* — The extended enquiry which has been entered into respecting the causes of the alterations which take place in the blood, furnish the chief indications for preventing their occurrence. The primary influence of the organic nerves upon the blood, and the effect rapidly produced upon this fluid by a diminution or vitiation of this influence, having been conclusively shown in respect of changes directly produced by this class of nerves, both on the blood circulating in the vessels, and on the functions of secretion and depuration, it becomes a matter of the first moment to preserve the vital manifestations of this important part of the nervous system from experiencing depression or exhaustion; especially where causes having this effect are in operation, and where there is any risk of those morbid matters, which have been shown in this article to be the chief sources of vitiation, being carried into the blood; particularly those vegeto-animal, or animal effluvia, which, floating in a moist atmosphere, act both by depressing these vital manifestations, and by infecting the blood itself. Persons exposed to those sources of disease should live on a due proportion of farinaceous and other vegetable substances, with a moderate proportion of fresh animal food, and preserve the energies of the digestive and assimilating organs; always attentively promoting the functions of secretion, depuration, and excre-

tion. At the same time many of the substances mentioned above may be employed as beverages, condiments, or preventives; more particularly the medicines formerly denominated antiscorbutics, the citric acid, lemons, lemon-juice with sugar; vinegar in which the warm spices, as capsicums, have been infused; the chlorides, camphor, quinine, &c. As it has been satisfactorily shown that great excitement and acceleration of the circulation, besides exhausting nervous and vital power, have also the effect of changing, and even of corrupting, the state of the blood, such excitement should be prevented, and allayed when present, by appropriate evacuations, and by refrigerant saline medicines and beverages.

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BLUE DISEASE. *Syn.* Cyanosis, (κίανος, blue, and νόσος, disease.) *Bæum's.* Morbus Cæruleus, Cyanopathia, *Marc.* Frangia Cyania, *Good.* Cyanose, *Fr.* Dis Blausucht, *Ger.* Blue Skin, Blue Jaundice.

CLASSIF. 3. Class, Sanguineous Function; 4. Order, Cachexias (Good). IV. CLASS, II. ORDER (Author, see Preface).

1. **DEFIN.** A blue, violet, or purple colour of the integuments, particularly of parts usually presenting a rose or flesh tint, as the cheeks, lips, mucous surfaces, &c.

2. A blue or purple colour of the integuments of parts, or nearly the whole of the body, may occur as a symptom in the last stage of various acute diseases. But it is present from the beginning of this affection, is frequently connected with comparatively little disturbance until some sudden change takes place, and generally results from chronic organic lesion. In other maladies this colour is an accidental, occasional, and not the most important symptom; in this affection it appears as the only, or the most remarkable, change observed during life.

3. **ITS PATHOLOGY.**—According to *M. GINTAC*, who has directed much attention to this affection, it always proceeds from organic change of the heart or large vessels; the admixture of venous with arterial blood, and the distribution of it to the surfaces of the body, being the immediate or essential cause of the alteration of colour. This pathology agrees with the opinion of *SENAC* and *MORGAGNI*: it has, however, been disputed. *M. CORVISART* first threw out doubts of the constant origin of cyanosis in this source; and more recently *MM. FERRUS*, *BRESCHET*, *MARC*, *LOUIS*, *FOUQUIER*, and *CHAMPION*, have adduced facts which seem to militate against it, while it has received the able support of *M. BOUILLAUD*.

4. *M. FERRUS* contends, 1st, That cyanosis sometimes has existed to an intense degree, and yet upon post mortem examination no lesion could be detected admitting of the admixture of venous blood; nor any organic change of the heart or respiratory organs: 2d, That the opening of Botal may continue unclosed for many years without blueness of the surface being occasioned: and, 3d, That the admixture and circulation of venous with arterial blood have been demonstrated to occur in some cases, without giving rise to this peculiar appearance. That the second and third objections are well founded seems almost incontrovertible. Numerous instances have been recorded by *LOUIS*, and others, which fully prove these facts. I have met with cases in children, where the communication between both sides of the heart seemed very free, and yet no alteration of the natural colour existed; and others, in which the change was evident during the paroxysms of suffocation only. But I must agree with *CORVISART*, *RICHFRAND*, *CLOQUET*, *GINTAC*, and *BOUILLAUD*, that the existence of this opening is no certain proof of admixture of the venous and arterial blood; for if the contractile powers of both ventricles are nearly equal, in relation to the resistance to be overcome, and if the natural openings of the cavities be not obstructed, no admixture of the blood in both sides of the heart could take place.

5. The principal force of the objections, therefore, urged by *M. FERRUS*, evidently rests upon the fact of the non-existence of organic disease of the heart, large vessels, or lungs; in some cases of the disease,—a fact which is still not satisfactorily established. I believe that it may be safely concluded, that the blue disease of infants

and children is very generally dependent upon a communication between the opposite sides of the heart, or some malformation of the heart or large arteries, particularly contraction of the origin of the pulmonary artery, or some other change affecting the circulation through the right cavities of the organ; whilst in older and aged persons, a similar colour of the surface may proceed from whatever obstructs the circulation through the large veins, lungs, or heart, and even from simple congestion of the venous capillaries from loss of vital power; and in these latter cases, the affection more nearly approaches the blueness observed to occur as a dangerous symptom of various acute diseases of the lungs and heart, as of asphyxy, and of pestilential cholera.

6. *Symptoms, progress, and terminations of blue disease.*—The bluish tint of the external surfaces, whence this malady derives its name, is not equally deep in every part. It is usually deepest over the whole of the face, and the lips in particular, on the hands, feet, and genitals. During any effort, or when crying, this symptom is much more marked than during repose: at the same time the parts presenting a bluish colour, or a violet of the darkest shade, are more or less puffed. The circulating and respiratory functions are rarely without derangement. The disordered circulation is characterised by palpitations more or less violent; sometimes accompanied by a very distinct bellows sound, and by a purring tremor, tendency to faintings, and serous effusions. The breathing is laboured and panting after the slightest effort. The warmth of the body is considerably diminished and patients are very sensible of cold. The functions in general, and principally those of locomotion, are more or less languid, and, as it were, benumbed.

7. The symptoms just described do not always exist in the same degree, during the continuation of the malady. It may even be said that the disorder is made up of a succession of paroxysms and remissions. In the paroxysms alone we observe those frequent faintings, that tumultuous palpitation of the heart, and suffocations, which endanger the life of the patient. No rule can be relied on as to the recurrence of these paroxysms; in fact, if it be certain that they are often brought on by over-exertion, fatigue, and violent mental agitation, it is equally certain that they occur without any assignable cause, and are more frequent in winter than in summer. The length of the paroxysm varies: it sometimes lasts several hours, and generally abates gradually. The termination of cyanosis is fatal to most patients; but some appear to recover entirely; others live for many years. Cases of this kind have been recorded by MORGAGNI, SANDIFORT, and RICHERAND. The death caused by this disorder is sometimes very sudden; but in the majority of cases it is preceded by an intense suffering, characterised by the most acute anguish, difficulty of breathing, fainting fits, and cold sweats. In a case of remarkable blueness from birth, in a girl, who was for some time under my care, the colour changed, in the course of two or three years, to dirty yellowish, chlorotic tint, which is still retained up to the thirteenth year. The disorder of the heart's action and respiration, in this case, although more or less considerable, was never very severe; but the child was always remarkably

delicate, and incapable of any bodily or mental exercise.

8. *Lesions observed after death: and their connection with the symptoms.*—1st, The most common lesion is the persistence or the re-establishment of the opening of Botal. This communication of the two auricles is generally accompanied by an obstacle to the passage of the blood from the right auricle into the corresponding ventricle, or from the latter into the pulmonary artery. Twenty-seven cases out of fifty three reported by M. GINRAC, presented such an obstacle. In twenty-six of these cases the circulation on the right side of the heart was impeded either by a contraction or by a total obliteration of the orifice of the pulmonary artery, and in only one case by the contraction of the right auriculo-ventricular orifice. Co-existent with these lesions is usually a hypertrophy of the right ventricle and auricle, or of one only of these cavities, with or without dilatation. Sometimes the ventricular cavity is itself contracted. 2dly, The ventricular partition has often presented a solution of continuity of more or less extent. 3dly, The arterial canal remained open in some subjects. 4thly, In one of the cases reported by M. GINRAC the two auricles (imperfectly divided) opened into the right ventricle: the latter being very large, communicated freely with the left, which (narrow and without auricular orifice) gave origin to the aorta. 5thly, In another case, the aorta and pulmonary artery sprung from the left ventricle, the latter being almost obliterated, and the inter-auricular partition perforated. 6thly, In another instance, the opening of Botal was preserved; the aorta disappeared after having supplied the cephalic and brachial trunks; the pulmonary artery, receiving the blood from both ventricles, formed the descending aorta. 7thly, Such a transposition of the larger arterial trunks has been witnessed, as the aorta springing from the right ventricle, and the pulmonary artery from the left; the opening of Botal and the arterial canal still remaining, or only the latter. 8thly, In some cases the heart consisted only of one auricle and one ventricle. 9thly, Two superior venæ cavae were seen, the one opening into the left auricle. It is unnecessary here to enlarge upon the other lesions noticed in persons afflicted with this complaint, because they do not necessarily belong to the subject.

9. As respects the relation between the symptoms and lesions, M. BOUVILLARD remarks, that the alterations pointed out in the central organs of circulation have usually the effect of permitting the black blood to mingle with the red; but some of these lesions, as previously observed, such as the opening of Botal does not necessarily entail this admixture; for which reason it is not invariably accompanied by blueness of the teguments; either the black blood not having mingled with the red, or the mixture being insufficient to produce the bluish colour. But when the arterial canal remains open; when the aorta springs from both ventricles jointly; or when, to the communication between the right and left cavities, is superadded an obstacle to the free current of blood in the former; a considerable quantity of black blood must necessarily mix with the red. Whenever an anormal communication between the cavities of the right and left divisions of the

heart co-exists with an obstacle to the circulation of the blood in the right ventricle or in the pulmonary artery, the mixture of the blood is not the sole cause of the discoloration of the skin, the puffing of certain parts, of various serous congestions, &c. In fact, it is evident, that the impeded circulation contributes mainly to the production of these phenomena. Should we not also attribute to the contraction of the auriculo-ventricular, or ventriculo-pulmonary orifices, the bellows sound and the purring tremor remarked in some patients? However this may be, some of the lesions coincident with blueness of the teguments are invariably congenital; while others (such as the communication between the right and left regions of the heart) may be either congenital or accidental.

10. The causes which develop most of the congenital lesions, from which blueness may ensue, are not easily determined on. But a communication between the right and left cavities of the heart may be occasioned by ulceration of the auricular and ventricular partitions, or by the rupture of these partitions, especially of the auricular, in violent and lengthened efforts. An obstacle to the course of the blood through the right auriculo-ventricular, or the ventriculo-pulmonary orifice, may also, particularly in the early stages of life, induce an anomalous communication between the two auricles, by ungluing, as it were, the valvular laminae, which, by their agglutination, have obliterated the opening of Botal. The existence of a similar obstacle at an intra-uterine period of life, when the opening still remains, may be also deemed a sufficient cause for its ultimate non-oblation. (*Diet. de Méd. et Chirurg. Prat. t. vi. p. 7.*)

11. I am of opinion, not only that such obstacles have very generally existed during intra-uterine life, and been the cause of the blueness observed afterwards, but that they have also occasioned, during foetal existence, a permanent state of distension; and thence, in some respects, malformation of the capillary system, particularly in the cutaneous and mucous surfaces, favouring congestion, and languid circulation through them after birth, and the consequent blueness, and the puffiness that generally attends it. I may add, as a matter of diagnosis, that very intense and general blueness is not uncommonly produced by the incautious internal use of the nitrate of silver. I have observed two or three such cases, and others are recorded by *ARBERN, ROGEE, &c.* (*Med. Chir. Trans. vol. vii. p. 284.*)

12. TREATMENT.—Art is of little avail in this malady. We must chiefly depend upon the efforts of nature in bringing gradually about a change in the lesions on which it depends; and attempt to assist her efforts, by directing bodily and mental repose, and a pure, mild, dry, equable and somewhat warm air; by attending strictly to the state of the biliary and other secretions, and the digestive functions; and by recommending gently tonic medicines, with an easily digested and nutritious diet. During the paroxysms, *M. BOUILLAUD* recommends blood-letting,—a practice which is by no means warranted by my experience. Depletions, and all other lowering means, aggravate the symptoms, and seldom or ever succeed in removing the severity of the paroxysms, for which he advises them. I have

derived more advantage from stimulating pediluvia, frictions of the surface of the body and lower extremities, and the administration of gentle antispasmodics and stimulants. (See *F. 348, 424, 663.*) In one or two instances, I conceived that some advantage was derived from the preparations of iron combined with the fixed alkaline carbonates. (See also *F. 94, 602, 718, 920.*)

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BRAIN—ITS MORBID STRUCTURES. SYN. *Ἐγκεφαλος*, Gr. *Cerebrum*, *Encephalon*, Lat. *Cerveau*, *Encéphale*, Fr. *Das Hirn*, *Gehirn*, Ger. *Cerebrum*, Ital.

CLASSIFICATION. SPECIAL PATHOLOGY and MORBID STRUCTURES. IV. CLASS, III. ORDER (Author, see Preface).

1. With the view of avoiding unnecessary repetition, and of furnishing a complete account of the changes and morbid phenomena connected with the parts contained within the cranium, alterations of structure will be considered in the first place, and in systematic connection; and, afterwards, inflammations affecting either the brain or its membranes, will receive attention. As similar lesions develop themselves in the brain, or its membranes, in the course of a variety of diseases; and as many of those which are most commonly found upon dissection give rise to very different phenomena during life; their arrangement in a separate form will facilitate reference to them, when those specific states of disease, which they either originate in, or occasion, are being discussed. Thus tumours formed in the brain, or purulent matter secreted there, or induration or softening of the cerebral substance, &c. are not infrequently found in cases of either palsy, epilepsy, insanity, or encephalitis, without limitation to any one of them. Instead, however, of describing these and various other lesions, when considering each of these diseases, I shall here give a minute description of the morbid structures observed in the brain and its membranes, and refer merely, when discussing these and other diseases implicating the cerebral functions, to those changes most commonly found on dissection of fatal cases, as they are described in this article.

2. Of all the organs of the body, the BRAIN is the most exquisitely and incomprehensively formed, and presents the least intimacy of connection between the results of dissection and the phenomena of disease. The most violent symptoms referrible to this organ often exist during life; and yet, on the most careful examination, after death, either no appreciable lesion, or none sufficient to account for the phenomena, can be detected. Whilst, on the other hand, many, and most important changes are frequently discovered in both the brain and its membranes, in cases which betrayed either no cerebral disorder, or none calculated to excite suspicion during life of any organic change. It is extremely important to be aware, not only of this fact, but of the circumstance just alluded to, that the same morbid appearances, or, at least, states so nearly alike

that they cannot be distinguished, will frequently be found after maladies very dissimilar as regards their cause, nature, and consequences. Thus, irritation of the brain occurring in the progress of fevers, and the exanthemata; convulsions, insanity, drunkenness, puerperal derangements, metastasis of gout, and various other diseases, will be attended with congestions, injection of the blood-vessels, secretions of lymph, or serum, or of air between the membranes, &c.—states in every respect similar to those proceeding from idiopathic inflammation. Nor should it be forgotten, that the kind of death, the particular circumstances attending it, and the position and changes to which the body is subjected immediately afterwards, tend very materially to influence the appearance and states of the parts within the cranium. In the view which I am about to take of the principal lesions of structure affecting the encephalon, I shall first notice the morbid states of its membranes; next, the lesions presented by its sinuses and other blood-vessels; and, lastly, the diseased appearances of the different parts of the encephalon itself.

3. I. MORBID STATES OF THE MEMBRANES OF THE BRAIN.—The intimate connection which the membranes of the brain have with the cranial bones on the one side, and the brain itself on the other, and their expansion between both, render them extremely liable to participate in all the malformations, diseases, and external injuries of those parts. Whilst they most commonly, with the limpid fluid exuded between them, separate those parts, and facilitate the motions of the latter, they also often prevent the extension of morbid action from the one to the other. But they do not always succeed in thus limiting disease; for they frequently become secondarily affected during maladies commencing either in the skull or the brain; and, when thus involved, they, in some measure, become the medium of mutual infection. But the membranes are not only thus secondarily affected; they are also not infrequently themselves the primary seat of disease; and when such is the case, the parts on each side of them, particularly the brain, seldom fail of participating more or less in the disturbance. Thus we often find them the primary seat of congestion, inflammation, with its consequences, as effusion between them of various kinds of fluids; and the source whence disease has extended to the brain itself. Those changes are presented to our view, not only in the primary inflammations of the membranes, but also in several forms of fever; in morbid affections of the mind, tetanus, delirium tremens, convulsions, epilepsy, apoplexy, palsy, and other diseases, wherein we have reason to suppose that the brain itself is either primarily and principally affected, or participates largely in the morbid states of its envelopes.

4. i. The DURA MATER is often found unusually adherent to the cranium, even when the brain and its membranes have been quite free from change, but more commonly when chronic disease has existed in either the one or the other. It is also sometimes slightly adherent to the skull, and occasionally this want of adhesion is very remarkable. In some instances, the dura mater is separated entirely from a portion of the cranial bones. In some rare instances, the space is filled with a watery fluid; but this has only been met with in

hydropic children. The separation is generally the result of external injuries; and either blood or pus, or even both, is usually found in the space between the bone and the membrane. In some cases, these effused fluids, particularly blood, either fluid or in coagula, are in considerable quantity, occasioning the usual symptoms depending upon pressure. Lymph, in various degrees of firmness, is also found between a part of the dura mater and the skull; and this, as well as pus, with which the lymph may be partially mixed, are generally the result of inflammations consequent upon external injuries. These appearances have been sometimes observed in fatal cases of epilepsy, but only when the patient has received some injury during the paroxysm. They are often connected with a puffy swelling of a corresponding portion of the scalp.

5. The dura mater itself may be here viewed as two membranes, closely united throughout by means of fine, close, cellular tissue: the exterior, or that applied to the cranial bones, resembling in structure, and performing the office of, periosteum; the interior, or unattached, being a reflection of the arachnoid, and having, as respects its functions, a more intimate relation to the included organs: the former being a fibrous; the latter, a serous membrane.

6. A. The fibrous structure of the dura mater is frequently more than usually vascular, particularly in fatal cases of apoplexy, paralysis, fever with cerebral symptoms, epilepsy, and in the congestions which occur in the last stages of whooping-cough, pulmonary diseases, asphyxia, and poisoning by narcotics. This state is, however, very different from inflammation, as the minute capillaries do not present the same degree of redness, particularly in the unattached or arachnoid surface. This structure is sometimes tinged with bile, and of a deep yellow colour through its whole extent, as in cases of acute jaundice, which are attended with comatose symptoms. After contusions, or when suppurations exist beneath or exterior to it, it is either yellow, dusky, bluish, brownish, or even blackish. It is also occasionally spotted with black, in some cases of melanosis. In some instances, this membrane seems distended from fluids effused in the cavities of the brain, or between the membranes: in others it is apparently corrugated or collapsed. This latter state generally proceeds from it having been punctured during the separation of the calvarium, the fluid which it had contained having thereby escaped. But it is sometimes noticed where no such accident occurs, particularly in extremely emaciated bodies, or in the very aged, when little or no water is collected beneath it. A more than usual dryness and transparency is occasionally observed in this as well as in similar structures. Unusual dryness is also sometimes conjoined with a shagreened state, and deficient transparency. Otto thinks that this is one of the remote effects of inflammation.

7. It is but rarely inflamed, excepting from external injuries, and then generally in circumscribed patches of greater or less size. In these cases, the injection and redness are very remarkable, particularly in the vicinity of purulent formations and injuries of the bones, or where ulceration, discoloration, fractures, abscesses, &c. exist in its vicinity. Suppurations, in which the pus is

found between its layers, or on its outer surface, are very rare. Cases, however, are referred to by OTTO of this occurrence. When suppuration does occur, it is generally seated in its inner surface. In some of these cases, the purulent matter has eroded, and perforated the skull and layers of the dura mater exterior to it. *Thickening* of the dura mater is not an unusual result of chronic states of inflammation. It varies extremely in degree, and it is sometimes so great as to occasion symptoms of pressure and irritation. It is sometimes found in fatal cases of epilepsy and paralysis; and is occasionally conjoined to *induration* of the thickened part. *Ossification* of the fibrous structure of the dura mater is a comparatively rare occurrence, whilst ossific deposits in its free or arachnoid surface are very common. In the former case, the bony matter follows the fibrous arrangement of the membrane, and involves its substance. Two interesting specimens of this change are referred to by Dr. BRIGIT (*Reports of Medical Cases*, &c. vol. ii. p. 663.). Ossific deposits may likewise be ascribed to slight, or chronic states of inflammatory action.

8. *Tumours* also form in the dura mater. Those which are most intimately connected with it have a *fibrous* structure; whilst the *fungoid* tumours sometimes observed seem to be common to both this membrane and the arachnoid lining it. Nor are they limited to the dura mater, as supposed by LOUIS and WENZELS; but they may arise also in the bones of the skull, as shown by WATSON, GALLI, and SHOLD; and even in the pericranium, as contended for by OTTO, EBERMAYER, and CRUVEILLIER. *Osteosarcoma*, or *fungus cranii*, therefore, as stated by VON WALLNER, and *fungus dura matris*, are merely different, although often simultaneously occurring forms of the same disease. (See § 17.) When fungoid tumours originate in the dura mater, they not infrequently perforate the skull, by occasioning absorption of the superincumbent portion of bone: but they also often involve the bone in a similar change, giving rise to *fungus cranii* as now stated. They occur in every part of the dura mater, commencing more frequently in its inner coat, and are found oftener in this situation, than in the bone itself, or the pericranium. (See CRANIUM.)

9. *Other kinds* of tumour are occasionally found in the dura mater. But those of a constitutional origin usually commence either in the arachnoid covering the dura mater, or in the fine connecting cellular tissue. They, however, generally soon involve, not only this latter membrane, but also occasionally the cranial bones. Of these tumours, comprising the *scrophulous*, *scirrhus*, *carcinomatous*, and the *hematoid*, I shall make more particular mention in the sequel. Although sometimes found in the inner surface of the dura mater, they are met with only consecutively upon their original manifestation in some other part of the body. More rare than any of the foregoing, is the occurrence of *fatty* and *encysted tumours* on the exterior surface, or between the layers of the dura mater. They have been found in this situation by MORGAGNI, FRICK, and OTTO; and, in very rare instances, have been observed to contain hair. *Scrophulous* tumours are less frequently found exteriorly to, and between the layers of, the dura mater, than in its internal surface.

10. *Unusual thinness* has been observed in some

parts of this membrane; and some of its processes have been wanting, owing to their *absorption*; in some cases, without any obvious cause, but more frequently from the pressure of a tumour of the brain, or some other morbid enlargement. "The falciform process, and a part of the sensorium, have been wholly removed, and large portions of the dura mater and its processes have been found as thin as silver paper." (HOOPER, *Morbid Anatomy of the Brain*, &c. p. 29.) When portions of the dura mater are destroyed by any internal cause, or even by external injury affecting the bone, they are rarely or never reproduced, and never otherwise than by a thick or *dense cellular tissue* closely connected with the newly formed bone; or, if the bone be not produced, after having been destroyed, it assumes a fibro-cartilaginous state, and becomes consolidated into a common cicatrix with the integuments. *Rupture*, or *laceration* of the dura mater, is generally the consequence of fractures of the cranium and concussion. It has, however, proceeded from violent coughing, after the superincumbent bone has been removed by fracture, or by trepanning, &c.

11. *B. Morbid states of the arachnoid covering the dura mater.*—The internal surface of the dura mater is lined by a reflected portion of the arachnoid membrane, the unattached surface of the dura mater thus consisting of a true serous membrane, intimately attached to, although different in its nature from, the fibrous structure which it covers. *Inflammation*, whether originating in the dura mater itself, or in this surface, chiefly manifests its distinctive characters and effects on this lining: and generally presents, especially in the early stages of the acute disease, a minutely injected state of the capillaries, with a bright red tinge of the whole surface. This appearance has been beautifully illustrated in the first of Dr. HOOPER's plates of lesions of the brain. When acute inflammation attacks this part, it is generally confined to one side, the longitudinal sinus or the falx furnishing the boundary of the disease. In very acute attacks, and in the advanced stages of inflammation of the dura mater, the internal surface becomes covered by a layer of *fibrous lymph*, into which, as I have shown in respect of serous membranes generally, minute vessels may be traced, when the exudation of this substance has been proceeding for some days. It is usually diaphanous, very delicate, and forming a complete adventitious membrane. In other cases, a much thicker, opaque, and albuminous-like membrane, of much firmness, less vascular and less intimately adherent to the dura mater, is formed. Although the fibrine and albuminous matter exuded may be both abundant, and thus provided with vessels, it is seldom the medium of adhesion; or, indeed, at all adherent, to the arachnoid covering the convolutions: and if adhesions have formed, they are very slight in respect of this latter duplicature of the arachnoid, unless very acute inflammation also exists in the pia mater, directly opposite to the inflamed surface of the dura mater.

12. In more chronic forms of inflammation, this surface not infrequently assumes a *spongy appearance*, with more or less redness and marked injection of the vessels. In some cases it has a *villous aspect*, from a slight exudation of albuminous matter, and interstitial effusion of serum

in the texture of the arachnoid lining. *Purulent matter* is seldom formed to any considerable extent; but, when it is secreted, it usually spreads thinly over the membrane. It seems generally to proceed from the inflamed surface, without any distinct appearance of ulceration. In some cases, however, owing to adhesions of the membranes around it, circumscribed accumulations of pus are met with; and these may cause the erosion of the dura mater and bones exterior to them. Although the productions now noticed sometimes are observed to follow idiopathic inflammations of this part, they are more frequently the results of external injuries; and are more commonly met with in the parts which cover the hemispheres, than in the basis of the skull, unless there be a very general state of inflammation of the parts within the cranium.

13. *Adhesions of the lining membrane of the dura mater to the arachnoid and pia mater* are chiefly observed when both reflections of the arachnoid are inflamed, particularly in chronic affections of the cranial contents. The medium of adhesion varies considerably. It is frequently found to consist of a firm but thin exudation of fibrinous lymph or of albuminous matter: in some cases, delicate, diaphanous, and vascular; in others, thick, opaque, and less intimately adherent to the internal surface of the dura mater than the preceding. In a few instances, it is formed of fine filamentous bands passing through a more than usually copious effusion of serum; and occasionally the membranes are intimately and firmly joined, even without any very apparent medium of union, particularly at the centre of the part adherent. This is chiefly seen immediately over or near the situation of severe organic disease of the brain itself, as abscess, tumours, superficial ulcerations, &c. In some cases, the adhesions are so firm that, in attempting to raise the dura mater, the subjacent membranes, with a portion of the brain, are removed along with it.

14. *Echymosis and purple spots* arising from the effusion of blood, in minute patches, beneath its arachnoid lining, are sometimes observed in the unattached surface of the dura mater, and partake of the character of purpura. They are most commonly found in cases of cerebral disease, which has been complicated with chronic change of the biliary organs and deficient energies of life, — or with general cachexia. *Carbonaceous deposits, or melanosis*, have also been sometimes observed in the situation. Dr. BUGNÉ believes them to be the result of extravasated blood. (See the art. *MELANOSIS*.) *Ossific deposits*, generally disposed in plates, or much thicker in the centre than the circumference, and varying much in number and situation, are also frequently found towards the surface of the dura mater. They seem covered by the arachnoid, are closely adherent to the dura mater, and formed between them. They occasionally present an irregular surface, or assume a nearly conical form, and are often connected with nervous diseases, particularly epilepsy. They are most frequently met with upon the falx, and near the part where the dura mater separates to form the longitudinal sinus.

15. *Tumours* not infrequently proceed from the internal surface of the dura mater. Many of these productions are actually formed in the arachnoid lining this surface; being only adherent,

and often very slightly, to the proper structure of the dura mater, and in no way changing its characters. As these tumours increase in bulk, they gradually produce debility of both mind and body, particularly the former. Much of the severity and rapidity of these effects will, however, depend upon the rapidity of their formation. When small, and sources rather of irritation than compression, convulsive affections are oftener occasioned by them than paralysis: when large, they more frequently give rise to paralysis than convulsions: but either of them may be followed by any of those affections; mental weakness being the more constant, and often the most remarkable effect. Many, also, of the tumours developed in the dura mater can scarcely be said to originate either in its fibrous membrane, or in its serous or arachnoid lining: but should rather be referred, at their commencement, to the cellular tissue uniting those layers. Amongst those which seem more frequently at least to originate in this latter situation, — although often involving, and in a very short time, all the layers of the dura mater, and even the parts adjoining, — the scrofulous, the cartilaginous, the hamatomatoid, and the encephaloid or fungous tumours, require the most particular notice. The *scrofulous tumour* is found on the internal surface of the dura mater, having an organised, fleshy, solid, and humid appearance; and is but rarely met with, and only in connection with scrofulous disease in some other part of the body.

16. The *cartilaginous tumour* is generally seated in close connection with the dura mater, and under its arachnoid lining. It varies as much in the perfection of the cartilaginous state, as in its size. It is sometimes perfectly cartilaginous; at other times merely gristly. It is oftentimes met with in the falciform process and tensorium; and is occasionally attended with ossific deposits in the same situations. Indeed, as remarked by Dr. HOORN and Dr. MONRO, some of those tumours are partly ossified, so that the cartilaginous state seems to be often an intermediate stage between that of gristly firmness and complete ossification. A case is described, by Mr. WARSON, in Dr. MONRO's work, of a cartilaginous tumour, the size of a walnut, containing bony matter towards its centre, growing from the dura mater. The *sub-cartilaginous tumours* are often tuberculous, of a dirty white colour, always distinct, but often numerous, and varying from the size of a pea to that of a hazel-nut. They generally are found between the dura mater and its arachnoid lining, have a broad base, present a clean smooth surface when divided, are firm, and devoid of vascularity. They seldom affect much the superincumbent dura mater and bone, but deeply indent the substance of the brain.

17. The *malignant tumours*, which are occasionally met with in the dura mater, assume the *sarcomatous*, the *carcinomatous*, and the *fungoid* characters. The fungoid disease may be either *encephaloid*, or *hematoid*. The *encephaloid tumour* is not common. Its divided surface is cellular and spongy, and gives out a pap-like matter when pressed. Its structure is more generally approaching to the fungoid, than to the tuberculous. It seems to be entirely produced from the lining membrane of the dura mater, and is almost always connected with scirrhus or malignant

diseases originating in some other part of the body. The *hamatoid tumour* is of the colour of venous blood, has a broad base, and a fungous, sometimes a tuberculous, structure. It is soft to the touch, is covered by a delicately lamellated tissue, thinner than silver paper. When divided, it appears spongy, and extremely vascular. It is very rare, and is always connected with the primary occurrence of the disease in some other part of the body. The *simple cyst*, or *watery tumour*, the *hygroma* of Dr. HOOPER, is seldom or ever observed in this situation, although frequently in other parts of the encephalon. A case of it, however, occurred to Dr. DUNCAN. The *acephalocyst*, or headless hydatid, has been found connected with the arachnoid of the dura mater, in a very few cases.

18. The *CAUSES* of malignant, or constitutional tumours in the dura mater, are generally external wounds or contusions, concussions, the scrofulous or syphilitic taint, and most commonly previously existing disease of a similar nature in other parts of the body.

19. The *SYMPTOMS* by which their existence may be inferred are extremely equivocal. At the early periods of their growth, they frequently give rise to little or no disturbance. Much, however, will depend upon the rapidity with which they are formed, and their situation. When they grow slowly, the portion of brain becomes gradually accustomed to, and, as it were, insensible of, the pressure; it seems to waste; and, if this compressed and atrophied part be not indispensable to the free exercise of the sensorial, intellectual, and locomotive functions, the disease produces no evident or sensible indication of its existence. But sooner or later the compression produced by them on the brain, or the irritation occasioned in the membrane, gives rise to symptoms of the most serious nature; frequently in a very sudden manner, sometimes more gradually. These chiefly consist of paralysis, epileptic convulsions, and apoplexy, occasionally occurring as suddenly as in the sanguineous forms of these diseases. Most commonly, however, and especially when the tumour is situated in or near the base of the brain, the symptoms, whether those of compression or of mental disorder, supervene more rapidly: sensation and volition gradually disappear from the limbs which correspond with the compressed portions of brain; the intellectual powers are obscured, and the patient soon becomes hemiplegic and idiotic. The gradual accession of hemiplegia, and of the other symptoms of compression, generally indicate that the paralysis arises from the development of a tumour, rather than from the formation of an apoplectic effusion of blood. The frequent occurrence, also, of acute pain in the paralysed limbs, of epileptic movements, antecedent cephalalgia of a violent character, with obscuration of the intellectual powers, somnolency, a cachectic habit of body, or the occurrence of disease in other parts of the body calculated to taint the system, as the scrofulous, syphilitic, carcinomatous, or fungoid diseases, are also circumstances indicating the formation of tumours in the membranes of the brain.

20. These tumours usually give rise to further disease of the brain, or its membranes, before terminating life; such as inflammation of the parts adjoining, effusions of fluid beneath or between

the membranes, adhesions of their opposite surfaces, destruction of the bones, softening and pulpy destruction, &c. of the cerebral substance; sanguineous effusion in this situation: and these increase the severity of the symptoms, and hasten the fatal termination. It should, however, be kept in recollection, that the effects produced by these tumours have in general no relation to their bulk. One of the circumference of one or two inches will often occasion (the situation and nature of the tumour being the same) as violent effects as another of four or five inches. It is, moreover, not to the tumour itself that the symptoms are to be imputed, but to the effects it produces on the brain and membranes.

21. ii. *MORBID CHANGES OF THE ARACHNOID AND PIA MATER.*—A. The ARACHNOID is so delicate, perfectly transparent, and so intimately adherent to the pia mater, except at the base of the brain, as to admit with difficulty of separation from it. The lesions, therefore, of the latter membrane should affect also the former, cannot be a matter of surprise. Indeed, the greater number of changes which I shall have to notice in this section generally invade both these membranes simultaneously, although either of them may be affected in a more or less marked degree.

22. *Inflammatory action* gives rise, though very rarely, about the optic nerves and between the lobes of the cerebellum, to small patches of beautiful *vascularity* in the arachnoid; the surrounding portions of this membrane being opaque, and adhering to inflamed parts of the pia mater. It is, however, very uncommon to find, even in the most intense inflammation of these membranes, red vessels in the arachnoid. The most frequent results of inflammation in this situation are, *thickening*, and the effusion of a watery or *serous fluid* under it, raising and separating it, in places, from the pia mater, particularly in the intergyral spaces. The *fluid* secreted in this situation is generally transparent, but it is sometimes turbid and albuminous, occasionally opaque, and tinged with bile in jaundice. In rarer cases it is tinged with blood. *Thickening* and *opacity* of the arachnoid vary much in degree. They are occasionally so great as to obscure the vessels and membrane underneath it. Less frequent than the foregoing is the secretion of a *puriform matter*, under the opaque and thickened membrane, giving the appearance of a diffused suppuration; and still more rare is the deposit of *fibrinous lymph*, unless in a state nearly approaching to an albuminous substance, or a puriform fluid.

23. The effusion of a *serous fluid*, in excessive quantity, exterior to the arachnoid of the pia mater, and in the bag of the arachnoid coat, around the encephalon, forming *dropsy of the cerebral membranes*, is sometimes observed. It has been fully demonstrated by M. MAJENDIE, and confirmed by other enquirers, that this membrane secretes a fluid, in health, varying somewhat in quantity with the state of the brain, and of its circulation; that this fluid cannot be materially diminished, or entirely deficient, without morbid phenomena being produced; and that it may, in disease, not only be secreted in too large quantity, but also in modified quality. In some cases of chronic and congenital hydrocephalus,

particularly when accompanied with *spina bifida*, the effusion is chiefly in this situation. In those, it is usually pellucid, and the arachnoid is not materially changed in its appearance. In more rare cases, however, this fluid has been observed somewhat turbid, as well as excessive in quantity; and the arachnoid opaque and thickened. In these, it would seem to have proceeded from increased vascular action affecting this membrane and the pia mater. Effusion of a watery fluid, however, in this situation, is much less frequent than in the ventricles. It is commonly congenital and chronic in these latter cases; and it sometimes protrudes the membranes, in large watery tumours, through apertures in, or between, the bones of the head. Several cases of this kind have occurred to me in the Infirmary for Children. In dropsy of the ventricles, which is most common, producing almost all the large watery heads, the fluid is collected in the bags of the arachnoid and vascular membranes lining the cavities of the brain, so that it is contained, either in all, or the greater number of them, at the same time, which is most frequently the case; or in one of them only. Serum effused from the arachnoid and vascular membrane (pia mater) may thus be situated:—1st, In the sub-arachnoid cellular tissue; that is, between the arachnoid of the pia mater and this vascular membrane: 2d, In the great cavity of the arachnoid around the encephalon: 3d, In the different ventricles, and even in the cavity between the two folds of the septum lucidum (BRESCHER). The quantity of serum effused in these situations varies remarkably. In *congenital and chronic cases*, it is sometimes uncommonly great, filling up and distending enormously the cranial cavity; impeding or arresting the development, altering the form, and even injuring or destroying the texture, of the cerebral substance, which is expanded in the form of a sac; that part of it above the ventricles sometimes consisting of the meninges merely. In *acute hydrocephalus*, the effusion takes place in a few days, and to a much less extent; and in *serous apoplexy* it may occur in a few hours. In these latter diseases, however, it is often a matter of dispute, whether the symptoms are more the result of the effusion, or of diminished vital endowment, and the state of circulation of the brain. (See DROPSY of the Encephalon.)

24. *Dryness of the arachnoid* is occasionally found after cases of excessive cerebral irritation, and where inflammatory action has been suspected. There can be no reason wherefore deficient secretion should not sometimes occur here, as well as in other serous membranes, as a result of inflammation. An *unctuous* state of the arachnoid is sometimes observed, particularly after erysipelas, abscess of the brain, discharges from the ear, paralysis, &c., and other states of disease, in which there was reason to infer the existence of inflammatory irritation of the membranes of the brain. *Adhesions* of the arachnoid to the opposite surface of the dura mater, by means of a cellular or firm albuminous false membrane, &c. have been already described (§ 13.). *Dark carbonaceous deposits*, similar to those noticed (§ 14.) in the internal lining of the dura mater, are also rarely observed in the arachnoid and pia mater. *Osteous deposits* also occur in the arachnoid, and are likewise rare.

25. *B. The PIA MATER* partakes in all the inflammatory states, and their consequences now described in respect of the arachnoid. The *vascularity* of this membrane varies greatly. Sometimes it consists chiefly of engorgement of its veins, imparting to it a dusky or purplish hue, without any sign of inflammatory or other change. Occasionally this congestion is attended with injection of the arteries, and increased redness only, or with these in conjunction with one or more of the lesions now referred more immediately to the arachnoid.

26. *Slight effusions of blood*, and patches of *ecchymoses*, varying from the size of a split pea to that of a half-crown, are occasionally found lying upon the surface of the convolutions, and retained between the meshes of the pia mater. This state arises from concussions of the brain, and congestions consequent upon suffocation, poisoning by narcotics, and the advanced stages of disease; also from obstructions in the vessels returning the blood from the brain. A layer of *fibrine* is sometimes, but rarely, observed as a consequence of effusions of blood between the pia mater and brain; the serum and red particles of the effused blood having been absorbed, and its fibrine remaining.

27. The *pia mater* and *arachnoid* are occasionally separated from the convolutions in consequence of concussion; and in some cases, particularly after acute or recent inflammations, they may be removed from the cerebral substance with scarcely any force, or with much less than in health, the vessels being loaded with blood. *OLIVIER* thinks that the *easy separation* of the vascular membrane from the brain originates in the effusion of lymph beneath the membrane, loosening its connection to the cortical substance. On the other hand, after chronic inflammation, occurring without effusion under the membranes, but with a considerable effusion into the ventricles, they are often found so *closely adherent* to the convolutions, that they cannot be separated, but in very small fragments, and then not without bringing away with them portions of the cineritious substance of the brain.

28. Patches of *yellow, albuminous, or albuminopuriform* matter, are sometimes found on the upper surface of the pia mater, between it and the tunica arachnoida. These patches are usually small; but they are occasionally very large, and diffused over nearly the whole of one hemisphere. *DR. HOOPER* has observed them covering nearly the whole of the base of the brain, so as to envelope most of the nerves. This appearance seems to result from a more than usually intense state of inflammation, as all the membranes are found inflamed, and the blood-vessels loaded with dark blood, and to differ but slightly from the effusion of *pus* and lymph already described in connection with changes of the arachnoid. *Ulceration and mortification* are very rare consequences of inflammation of the pia mater. They may, indeed, be rather considered as superficial ulceration and gangrene of the brain. Cases, however, have been met with, sometimes connected with superficial supuration, affecting chiefly this membrane. (*BUZZI, MORGAGNI, DUBREUIL, OTTO.*)

29. *Tumours* often grow from the *pia mater*. The *scrofulous kind of tumour or tubercles* are not very rare in this situation. When they occur,

they sometimes reach a large size, and break down into a puriform fluid, forming circumscribed or encysted abscesses on the surface of the brain. LEIVELLÉ found them as large as an egg, in an idiot. Cases are also described by EARLE, ABERCROMBIE, OTTO, and others. Tumours of a *sub-cartilaginous structure* are very rarely met with in the pia mater, although occasionally in the *choroid plexus*. They are usually of the size of a pea, round or oval, laminated, cartilaginous in the centre, exteriorly tuberculous, and covered with a delicate vascular membrane.

30. True *encysted tumours* are also sometimes met with in the pia mater. OTTO describes one of immense size, — six inches long by three broad, — found on the right hemisphere of the brain of the Duke of Saxe-Gotha. Esquiroi met with a tumour of this kind containing fat; and similar instances have been recorded. *Ossific deposits* and *earthy concretions* have been rarely observed on the internal surface of the pia mater, dipping down into the structure of the brain.

31. *Serous cysts*, the hygroma of Dr. HOOPER, consist of a delicate and transparent membrane, filled with a clear, limpid serum. There is in some cases only one, in others two, three, four, or even more. When solitary, they vary from the size of an orange-pip to that of a walnut; but they are seldom much above the bulk of a large pea. When numerous, they are usually much smaller. They are very rare in the membranes of the exterior surfaces of the brain; but they are very common in the *choroid plexus*, where they are frequently in clusters. They have been mistaken for hydatids, but are merely simple cysts, containing a serous fluid. They have likewise been found in the adventitious membranes formed on the surface of the brain. They generally furnish no symptom by which their existence can even be suspected during life. The *acephalo-cyst*, or headless hydatid, is seldom or never found in the pia mater. Five species of the *Cysticercus*, or the bladder-tailed worm, namely, the *C. tenuicollis*, the *C. Fischerianus*, the *C. dicystus*, *C. punctatus*, and the *C. Finna*, have been discovered respectively by BRERA, FISCHER, LAENNIC, TREDTLER, and WERNER, either in the pia mater or *choroid plexus*. (*Art. Cysticercus*, *Dict. de Méd.*)

32. *Fungoid, hæmatoid*, and other malignant tumours, are sometimes found in the pia mater and arachnoid; but I believe they are seldom or never met with as a primary disease, but associated, as a consecutive change, with fungoid or malignant disease in some other part of the body. When they grow to any considerable size, they become deeply indented into the convolutions; producing at first irritation, and afterwards, as they increase, symptoms of pressure. When, therefore, such phenomena present themselves in persons with fungoid disease, we may suspect its development also in the brain.

33. *C. The Choroid Plexus*, and the *vascular plexus* of the fourth ventricle, which are all productions of the pia mater, are often found remarkably *distended with blood*, and their *vessels varicose*, particularly when the pia mater has its vessels overcharged. The choroid plexus is also sometimes uncommonly *pale and exsanguine*. This generally occurs when considerable effusion of serum has taken place in the ventricles, especially

when the effusion is connected with debility. Sometimes the plexus contains a number of *transparent vesicles* (see § 30.), and it occasionally presents a *granulated* or *fleshy* appearance. This has been ascribed to a morbidly enlarged state of the glandular apparatus, with which, in the opinion of some anatomists, this structure is naturally provided. *Gelatinous tumours* about the size of a bean, and surrounded by a cyst, have also, though rarely, been observed in this situation. Tumours of a *cheesy* or *sub-cartilaginous* consistence, the size of a pea, are likewise found, in some rare cases; and occasionally these tumours contain *ossific deposits* in their centres. *Bony and earthy concretions* are still more rarely met with in the choroid plexus than in the membranes. All these morbid changes have been most frequently observed in apoplectic, epileptic, and paralytic cases; but they have also been frequently detected where no particular symptom referable to the nervous system had manifested itself during life.

34. The *membrane which lines the ventricles* is naturally extremely thin and transparent. No blood-vessels, excepting those which ramify over the corpora striata and thalami from their trunks, which pass by the side of the tænia semicircularis, are usually observed in it. The vessels, however, of this membrane are sometimes found much enlarged, and gorged with blood, particularly when a fluid is collected in the ventricles, so as to distend them beyond their natural capacity. In this state the membrane is not only more vascular, but also much firmer and thicker than natural. The septum lucidum is sometimes as thick as the dura mater, and very firm; but more commonly, those parts of the membrane which are thickened and rendered opaque, are also soft and pulpy.

35. *Coagulated albumen* is occasionally found on the surface of the ventricles. It is sometimes met with in layers on the corpus striatum and the thalamus. I have found it of great thickness; and in one case, which recently occurred to me at the Children's Infirmary, it nearly filled both ventricles. *Ulceration* proceeding from inflammation is occasionally met with in this surface, particularly in the corpus striatum. It seems generally to arise from the formation of a small abscess or purulent collection under the membrane, which it ruptures, the fluid thus escaping into the ventricle.

36. *D. Inflamed states of the pia mater*, with ulceration, puriform secretion, are, as well as other lesions of this description in other parts of the brain, most frequently occasioned by external injuries. Inflammatory irritation, affecting the arachnoid and vascular membrane either of the periphery of the brain or of the cavities, is not an unusual consequence of injuries of a serious character sustained in other parts of the body, as after compound fractures and contusions of the limbs and joints, severe burns, &c. In these cases, a similar state of the membranes, as well as a nearly similar kind of delirium to that which has been called delirium tremens, sometimes occur. Inflammatory states, either with dryness of the membranes, but more frequently with effusions of various kinds, often take place in the progress of acute diseases, particularly fevers, and the exanthemata; from drunkenness, accidents, concussions, or mental excitement; whilst congestions, effusions,

and infiltrations of blood, proceed generally from interrupted circulation through the heart and lungs, narcotic poisons, asphyxia, &c., and frequently are attended with convulsions, stupor, coma, paralysis, &c. The adventitious formations are usually the result of a cachectic habit of body, as scrofula, deficient vital power, and the vitiation of the system by syphilis, and the cancerous or carcinomatous taint.

37. iii. DISEASED STATES OF THE SINUSES OF THE DURA MATER. — *Inflammation* of the sinuses is sometimes observed, in its advanced stages and consequences, and but rarely at the early periods. In this latter case, they manifest chiefly increased vascularity, and redness of their internal lining, with slight thickening and friability, sometimes with softening, and occasionally with abrasion, and give rise to the following changes, seated immediately within the part of the vessel which is inflamed: — 1st, To the coagulation of the blood in contact with, and its adhesion to, the inflamed surface of the vessel: 2d, Subsequent discolouration of the coagulum, and its conversion into a state nearly resembling that of coagulated lymph: and, 3d, The presence of pus, which is usually found in the middle of this coagulum, though not always. *Thickening* of the membranes forming the parietes of the sinuses is occasionally remarked, and is evidently a result of a slow state of inflammatory action, affecting chiefly the fine cellular tissue connecting the serous lining to the fibrous membrane. Sometimes their parietes are remarkably thick and dense, almost approaching to cartilage, this morbid change being chiefly seated in their connecting cellular substance. *Firm fibrinous formations, or coagulated lymph*, are also occasionally formed in these vessels; in some cases, conjointly with marks of inflammation in them; the internal tissues of the vessels being red, injected, congested, and of a dark colour; and in others without any very marked appearance of such disease, but with evident thickening of their parietes. In several instances I have observed these formations disposed in the form of false membranes within the sinuses, and adherent to their serous lining. While the more exterior surface of these false membranes, or that next the vessel, is generally firm, the interior of the canal which it forms is soft, and contains a purulent like matter mixed with a concrete albuminous substance.

38. In other instances, no fibrous concretions are formed, nor is the vessel perceptibly inflamed, and yet *pus* is found in parts of the sinuses, either distinct and in considerable quantity, or mixed with firm coagula, or with clots of blood, and in small quantity. In these cases there is reason to suppose that pus has been carried by the veins into this situation from an adjoining part. In some cases it occurs accompanied with an albuminous-like effusion, more or less concrete, or with firm fibrinous coagula, and an inflamed state of the internal membrane of the vessel. In many, the presence of pus is connected with an apparent abrasion, and even ulceration of the internal surface of the sinus; but in others, increased vascularity, with patches of deep redness, or of congestion, with a deep lividity, and, occasionally, slight thickening with diminished cohesion of the parietes of the vessel, are most remarkable. In all these, there can be no doubt that the puriform

fluid is deposited in this situation from the surrounding inflamed parietes of the vessel.

39. The lesions now described are most frequently connected, in adults, with chronic disease of the bones of the cranium; and, in rarer instances, with disorganisation of the brain itself and of its membranes. They are most frequent after fractures of the skull, and external injuries: and I believe that they are occasional consequences of the worst forms of erysipelas of the head, a case of this description having occurred to me, in which inflammation of the sinuses of the dura mater was found upon dissection. They are more common in children, according to my experience, than in any other class of patients; particularly from the age of one and a half or two years to ten or twelve. I have observed the appearances now described in several cases of cerebral disease; or, at least, of cases terminating with the usual symptoms of pressure on the brain, following severe states of porrigo, ulcers of the scalp, and chronic diseases of this structure, particularly in scrofulous, weak, and ill-fed children. The observations of M. TONNELLE and of M. RIES fully agree with my experience as to the pathological relations of these lesions of the sinuses.

40. The sinuses also present a *vermilion colour* of their internal membrane, like that which is sometimes found in the arterial system. This appearance is most probably caused by a morbid state of the blood; and it may be, on some occasions, a *post mortem* change, arising from the staining of the internal surface of the vessels by the colouring part of their contents. In respect of the *state of the blood* itself in the sinuses, much diversity exists: the quantity contained by them also varies greatly. More frequently they are empty, or nearly so. When they contain blood, it is in some cases dark, semifluid, or thick; in others, less dark, and more fluid; in the greater number, either altogether or partly coagulated. In a few, it is separated into a serous or sero-sanguineous fluid, and a fibrinous coagulum having no connection with the parietes of the vessel, the coagulum consisting entirely of the fibrine of the coagulated blood, and not of the albuminous fibrin, or coagulated lymph, already described (§ 36.). In some cases, one or more of the sinuses is filled with a dense, firm, and brown *coagulum*, perfectly continuous throughout; branching even into the veins which open into the sinuses; and not interrupted, soft, and forming variously sized clots, such as are often found after death. This state of the contents of the sinuses is seldom or never connected with inflammation of its parietes, unless the inflammation has occasioned, by means of the albuminous matter effused, a complete obstruction of the vessel, and, consequently, the accumulation and gradual coagulation of the blood beyond it; being a change in these fluids independent of organic lesions of the parietes of the sinus, unless such lesion occasion obstructed circulation through it.

41. The firm, dense, and continuous coagulum now described is evidently the result of a slow coagulation proceeding in the sinuses previous to death; and, in every instance in which I have observed it, has arisen from obstruction in the return of blood from the sinuses, owing to compression of the jugular veins, by tubercles, scrofulous tumours, or other organic changes obliter-

ating the canals of these vessels, or of the sinuses themselves; or from a stasis of the blood, followed by coagulation in these vessels, arising in consequence of great cerebral congestion, joined with the utmost general adynamia. There is no doubt that the effusion of lymph, in any of its states, or even of purulent matter, will, while in connection with the internal surface of an inflamed vessel, or mixing with the blood in it, dispose this fluid to coagulation; forming a nucleus around which coagulation will proceed, or a point from which it may depart. And such seems to be the source of the more or less extensive and continuous coagula, which we frequently find in connection with inflammatory lesions and formations in the sinuses. But such is not the case here. In the course of an extended experience at the Infirmary for Children, I have observed, in several cases, that this state of dense coagulation of the blood in the sinuses manifestly supervenes before death, owing to the general and local conditions now stated, and gives rise to all the symptoms of more or less complete and sudden compression of the brain, owing to the consequences I am now to notice as arising from it, in common with other causes of obstruction in the sinuses. In cases of this description, if no effusion of blood have occurred, the veins are found generally engorged with dark blood. In some cases, the distension of the veins had given rise to an exudation of blood, or rupture of several of their minute distributions, with copious extravasation of this fluid; and in many, the distension of the veins was accompanied with copious effusions of serum in the ventricles, between the membranes, or in both situations.

42. The *glandulae Pacchioni* are sometimes so much increased in number and size as to obstruct the passage of blood through the sinuses; give rise to the appearances now described; and thus, as the other changes in the sinuses, terminate in some one or other of the apoplectic states. Mr. EARLE (*Medico-Chirurg. Trans.* vol. iii. p. 66.) has observed these glands changed to the appearance of grumous blood, in connection with fungoid disease in the brain. They are more frequently enlarged and hardened; and, occasionally, they cause an absorption of the dura mater, with corresponding depressions in the superincumbent bone.

43. The *bands* which cross the longitudinal sinus are occasionally more numerous than natural; and they are sometimes thickened, particularly in connection with a similar change of the parietes of the sinus.

44. The *veins on the surface of the brain* sometimes contain a few bubbles of air; but it is doubtful whether this is a morbid state or a *post mortem* change. They are occasionally filled with *fibrine*, particularly in those cases which presented a corresponding state of the sinuses. *Pus* has also been observed in them, especially in cases of inflammation, with secretion of pus under the arachnoid.

45. *Ossification* is detected only in the *arteries*; but it occurs in them very frequently, and to a very great extent, particularly in advanced life. The early stages of this change have also been discovered in youth, although rarely. The *arteries* most commonly found ossified are the internal carotids and the basilar; but the circle of Willis,

and the vessels departing from it, as well as the arterial ramifications which appear between the convolutions, and come out upon the surface, often participate more or less in this morbid state. *Cartilaginous* degeneration is still more extensive, and seems to precede the ossific deposits. *Cartilaginous* and *ossific* formations in the coats of the arteries of the brain occasion irregular distributions of blood, and interrupted or imperfect supplies of this fluid to some parts of the organ; disposing to aneurismal dilatations, to rupture, and, consequently, to the production of apoplexy and paralysis. In most instances of extravasation of blood in the substance of the brain, this condition of the arteries exists; and is, most probably, the cause of the extravasation, by disposing it to congestion, and rupture from increased action of the heart.

46. *Aneurismal dilatations* of the arteries of the encephalon are by no means very uncommon: they are most frequently met with in the carotids after they have entered the cranium, in the large branches, and in the basilar artery. They may derange the circulation of the brain, or may occasion effusions of either blood or serum, without themselves having been ruptured; but they more frequently break, occasioning apoplexy. The arteries, particularly those about the base of the brain, and some part of the branches forming the circle of Willis, are also occasionally *obliterated* and reduced to a thin chord.

47. II. LESIONS OF THE SUBSTANCE OF THE BRAIN. — The morbid states of the brain have been investigated in modern times with the greatest success and advantage to practical medicine. The labours of REIL, SERRES, LALEMAND, WENZEL, GALL, ROSTAN, ABERCROMBIE, HOOPER, CRAIGIE, and DUNCAN, have chiefly tended to this advancement; whilst a number of other enquirers have added much of importance, as well as confirmed the observations of more original enquirers.

48. i. INFLAMMATION OF THE SUBSTANCE OF THE BRAIN. — *Encephalitis*. — *Cerebritis*. — *A. Acute inflammation* of the brain does not frequently occur as an idiopathic or primary and uncomplicated malady. It is in consequence of previous disease, as fevers, the exanthemata, inflammations of the ears, extravasated blood, tumours and tubercles of the brain, of poisons, and external injury, that it comes most frequently before the pathologist. Resulting from injury, it is generally limited in extent, although intense in degree. The whole brain is rarely or never affected at the same time, but only a part of it; and the disease is seated either in the vascular membrane, or in the cortical substance, or in the medullary matter of the interior parts, of the brain, or in them all simultaneously. The part affected first becomes vascular, and the injection of the vessels proceeds till the cerebral substance displays a red tint, deepening, as the disease advances, until it assumes a reddish brown, and, occasionally, even a brownish or green shade. With this increased intensity of disease, the part becomes softer than natural. The formation of matter, however, is not so frequent a consequence of this form of inflammation as of that of a sub-acute or chronic kind, occurring in persons of a scrofulous diathesis, and unhealthy habit of body, unless when a foreign substance, or piece of bone, has been driven into the brain. Somewhat similar to inflammation,

although decidedly different from it, is that state of morbid irritation frequently met with in fevers, especially typhus, eruptive diseases, epilepsy, delirium tremens, tetanus, convulsions, hydrophobia, nostalgia. In these diseases, vascular turgescence and red injection of the brain, are usually seen; but not the general red colouring, the spot-like effusion of blood, and the change of consistence, which characterise acute inflammation of this structure.

49. Acute cerebritis occasions violent headach, intolerance of light, acuteness of all the senses, delirium rapidly succeeded by convulsions, coma, and death. When it arises from morbid poisons affecting the system, as in gaul and camp fevers, purulent formations are more frequently met with, as stated by PRINGLE and others. In these cases the symptoms are somewhat varied; the prostration of the powers of life being much greater, and the delirium of a much lower grade. In those diseases, the *post mortem* inspections, when numerous, will furnish examples of the various stages of lesion, from the first appearances of injection of the vessels to the formation of matter, or complete destruction of the part chiefly affected.

50. B. Suppuration of the brain. — Abscess of the brain, — *Apostema cerebri*. — Collections of purulent matter have been often found in the brain, generally as a consequence of inflammation of a sub-acute or chronic kind. Of this the writings of BONET, MORGAGNI, LIEUTAUD, BAADEN, STOLL (*Rat. Med.* i. p. 285.), FRANK (*Acta Inst. Clin. Vind.* Ann. i. p. 75.), PROCHASKA (*Anat. Acad. Fasc.* part ii. sect. ii. cap. 2.), SCHAEFFER (*Hufeland und Himly, Journ. der Pr. Heilk.* 1809.), PORTAL (*Mémoires de l'Acad. des Sciences*, 1780, p. 315.), LALLEMAND, BAILLIE, BRODIE, POWELL, HOOPER, and ABERCROMBIE, furnish numerous examples. The situations of these abscesses vary considerably, as well as the kinds of abscess formed. a. Sometimes the purulent collection is lodged in an irregular cavity, and appears unsurrounded by any distinct cyst. These take place to a greater or less extent, and consist most commonly of purulent matter mixed with flakes of lymph, giving it a slight curdly appearance. They are most commonly found in the anterior lobe of the cerebrum, or in the centre of the hemisphere. Some of the abscesses of this kind seem to consist of several small cavities communicating with each other: these are usually found also in the anterior lobes, the centres of the hemispheres, or near the striated nucleus of REITZ. b. The next species of abscess consists of a distinct, firm cyst, or even cysts, as observed by LALLEMAND, and seems to have been the result of a slower process of formation, and of a less acute form of inflammation: it contains purulent matter, and is most frequently found in the centre of the hemispheres, particularly just above the central oval of VIEUSSENS, or at its margin. Abscess of the brain has also been met with immediately below the *cornu ammonis*; likewise near the parietes of the small posterior cornu of one of the lateral ventricles, and just below the unciform eminence which rises into the interior of this cavity. In one instance only (*North Amer. Med. and Surg. Journ.* 1818.), have the *tubercula quadrigemina*, and pineal gland, been the seat of abscess.

51. c. Purulent matter is also found in some part of the brain, infiltrated, as it were, into the cere-

bral substance in the form of a number of minute drops, and occupying a considerable extent, but not lodged in any single distinct cavity: the parts surrounding the purulent infiltration presenting scarcely any other appearance of change, excepting more or less softening, which is always present, and seldom any sign of augmented vascular action. This morbid state is frequently observed as the consequence of the transit of purulent matter into the circulation, which, in some cases, is secreted from the vessels in the substance of the brain, giving rise to the infiltration. This phenomenon takes place much more frequently in the parenchyma of other organs, as of the liver, lungs, and spleen, than in the brain. The infiltration, whether proceeding from this source or not, often passes into the condition of distinct collections, varying in number and size; and sometimes they nearly or altogether communicate. In such cases, the cerebral substance separating these collections seems as if it were softened, or broken down into the purulent matter, and often processes of the cerebral structure, still adhering to the surfaces surrounding these collections, are floating in them, appearing as the debris of a portion of the disorganised brain. In these cases an approach is made to the formation of a regular cavity. In other instances, if the disease is less rapid, or does not destroy life before further local changes take place, a distinct cavity is effected, which, at first, consists of the cerebral substance merely, softened, discoloured, and vascular. M. ANDRAL thinks that the following characters presented by the cavities containing purulent matter are the result of subsequent changes which the surfaces of these cavities undergo, and not the result of an original dissimilarity of structure. As to this point, I think his reasoning inconclusive, and his proofs insufficiently strong. It, however, should be admitted, that the purulent infiltrations, and collections in either of the forms now noticed, are those which take place most rapidly, and which are generally observed in *post mortem* researches, in cases of death taking place soon after the symptoms of cerebral disease had supervened; whilst the encysted form, as I have already stated, are those which manifestly form most slowly.

52. d. The different kinds of parietes surrounding the collections of matter in the brain, according to this able pathologist, are, — 1st, The cerebral structure itself, which, in recent and acute cases, forms the only envelope of the purulent collection; but which may assume the following appearances successively, according to the duration of the disease. 2d, A cellulovascular substance, extending over the whole of the internal surface of the cavity, or merely in parts. 3d, A true membrane, which is as yet soft, and flocculent, but yet admitting of separation from the adjoining nervous substance. 4th, A fine membrane, presenting a distinct organisation, and capable of being detached either in pieces or entire. Once arrived at this stage, their internal surface often has the appearance of villousities, whilst sometimes the cyst is composed of two or more distinct layers, which may be detached from each other. In these cases, the cysts are thick, as remarked by PROFESSOR LALLEMAND; the internal layer, or cyst, being of a reddish white, and presenting the appearance of a mucous sur-

face slightly inflamed. In a case noticed by this author, in which three distinct layers, or cysts, were observed, the exterior was cellular, adhering to the cerebral substance; the middle one thick and firm; the interior layer closely resembled a mucous surface. MACKEL, however, espouses a different opinion from ANDRAL, as to the formation of abscesses contained in distinct cysts. These are not, according to him, owing to advanced changes in the organisation of the walls of the purulent collection; nor are they to be ascribed to suppuration of the cerebral texture itself; but to inflammation and suppuration of an adventitious structure, developed in the cerebral substance. His reasons for this opinion are, — 1st, That those cysts adhere but very loosely to the surrounding cerebral texture: 2dly, That this texture is not hardened, but, on the contrary, softened, immediately around them.

53. The cerebral substance in which the purulent infiltrations and collections of the first grade are found, is generally softened, and, excepting when they arise from the absorption of purulent into the circulation, more or less injected.

In cases of purulent collections contained in more or less distinct cysts, or membranes, the surrounding structures are often but slightly altered, and occasionally not even perceptibly so. But when the collection has much increased, or continued long, the nervous substance surrounding the cyst becomes irritated, inflamed, discoloured, and softened; and then only supervene those symptoms which evince, unequivocally, the existence of abscess or serious organic lesion: for, up to this period, the abscess may have been proceeding, but so slowly as not to disturb the functions of the organ, until, owing to some determining cause, in conjunction with the changes taken place in the cyst, its contents, or with its size, the substance of the brain surrounding it becomes diseased.

54. Abscesses, whether immediately surrounded by the cerebral structure, or contained in more or less distinct cysts, may vary in number from one to six or seven, each distinct from the other, and seated in various parts of the brain. They may present appearances of ulceration in their parietes; and they may be accompanied by a variety of other lesions of the brain and its membranes, generally in different subjects, but occasionally even in the same case. Inflammatory appearances of the membranes; effusions, serous or albuminous, in either the external or internal surfaces of the organ; softening of the structure, tumours, occasionally hardening, &c.; are their usual attendants.

55. *e.* In respect of appearance, the pus found in the brain differs in no way from that formed in other textures of the body. M. LALLEMAND (*Récherches Anatomico-Patholog. sur l'Enceph.* &c. let. iii. p. 361., let. iv. p. 41.), whose numerous observations of purulent collections in the brain have enabled him to give much interesting information on this topic, states, that he has observed it of a yellowish green tint, yellowish, yellowish white, greenish, greyish, yellowish grey, whitish grey, dirty white, and altogether white. He, as well as ABERCROMBIE, has frequently found it extremely fetid. This fetor of the pus I have observed in several cases of abscess occurring in young subjects, from the extension of

inflammation of the ear to the brain. In a case of this description, reported in the *Medico-Chirurgical Review* for Dec. 1830, the fetor of the purulent collection was extreme; and the cerebral substance surrounding it greenish, disorganised, and broken down into the contained matter. Abscesses formed within the substance of the brain occasionally make their way to some part either of the external or of the internal surface of the organ: thus they sometimes break into the ventricles, as in the case just now alluded to: when they open upon the periphery of the cerebrum, they occasionally destroy the bone and intervening membranes in its immediate vicinity, before death is occasioned. M. ANDRAL says, that he has observed an abscess of the brain destroy the cribriform plate of the ethmoid bone, and escape externally through the nasal fossæ: and M. ITARD, LALLEMAND, and others have shown, that abscess of the brain, from an extension of inflammation from the ear, may destroy the petrous portion of the temporal bone, so far as to admit of the evacuation of the abscess by the ear. In cases originating from this

the matter is frequently contained in no distinct cyst, the cerebral structure surrounding it being generally discoloured, softened, and often appearing as broken down into it. Sometimes the meatus externus and internus are shut up by means of fungous granulations preventing the external exit of the purulent secretion, and hence probably, in some cases, diverting it internally. In some cases more than one abscess, in some instances four or five, seated in distinct parts of the brain, have been observed.

56. *f.* Collections of purulent matter have likewise been found by BIANCHI, STOLL, WEICKARD, J. PHANCES, FRANK (*De Curand. Homin. Morb.* lib. ii. p. 49.), NANNONI, PILRAULT (*Journ. de Méd.* t. vi. p. 389.), and ABERCROMBIE, in the cerebellum, generally contained in more or less distinct cysts, "the walls of which were membranous and vascular." Matter, indistinctly defined, has been found also in the *medulla oblongata*, generally in small irregular cavities, "especially in that part of the olivary body which contains the corpus dentatum." (CRAIGIE, *in opus. cit.* p. 386.) Dr. ABERCROMBIE mentions a case where it was met with at the junction of the protuberance.

57. *g.* These collections are evidently the result of inflammation, but of a peculiar and slow character, probably owing to the constitution of those in whom they are most frequently found, and who are generally of the strumous diathesis. The encysted abscess seems to take place very slowly, and to be analogous to what has been commonly called *chronic* or *cold abscess*. The purulent infiltrations occasionally meet with in the large nervous masses, as well as in other viscera, from the absorption of purulent matter into the circulation, evidently take place with great rapidity, and are a result rather of morbid secretion, than of inflammation.

58. *h.* Abscess of the brain is very frequently met with as a consequence of purulent discharge from the ear. This affection of the ear, when it has not apparently proceeded from inflammatory sore throat, and the extension of the inflammation along the Eustachian tube, is very generally connected with a sub-acute or chronic inflammation of the dura or pia mater of the brain; and is thus frequently extended to the substance of the brain

itself, terminating at last in abscess in this situation. This has been satisfactorily shown by MORGAGNI, ITARD, POWELL, LALLEMAND, DUNCAN, ABERCROMBIE, CRAIGIE, and others. BONET, and, more recently, Mr. BRODIE, supposed that the affection of the ear was consequent upon that of the brain, or at least coeval with it; and hence they ascribe the discharge from the ear to the inflammation of the membranes having extended itself from the dura mater of the temporal bone to the tympanal cavities. When abscess of the brain takes place owing to the affection of the ear, they consider it an extension of the inflammation from the membranes internally to the substance of the brain, in consequence either of the unhealthy habit of the patient, or of improper treatment, by suddenly suppressing the discharge, "and converting a chronic external inflammation into an acute internal disease;" the external discharge having been, as it were, arrested and turned in upon the cerebral substance. The only question here is in respect of the particular parts in which the inflammation originates; as to the consecutive phenomena, there seems to be no difference of opinion: and this point can be decided by the symptoms only, and the order in which they occur. If the purulent discharge take place without any previous internal and deep-seated pain, and the dangerous symptoms follow upon the suppression of the discharge, we may infer that the disease has commenced in the ear, and extended itself to the membranes and brain itself. This is, perhaps, the most frequent procession of the morbid phenomena. But, occasionally, a different course is manifest, especially in delicate children, and patients of a strumous diathesis. In these, symptoms of disease of the brain or its membranes are very manifest before the discharge takes place; and when it does take place, either the patient recovers under judicious management, or, upon the disappearance or suppression of the discharge, a sudden exacerbation of the symptoms are observed, with delirium, coma, convulsions, &c. followed by death. Such is the result of my experience in a very great number of cases which have come before me; so that I am led to conclude that, whilst the opinion adopted by MORGAGNI and his followers, on this question, is often correct, that espoused by BONET and BRODIE is not wholly without foundation.

59. But it is not infrequently observed, (and I have met with several instances in grown up persons,) that patients have been occasionally liable, for years, to a puriform discharge from the ear,—occasionally from childhood, with little remission, and with little or no farther ailment. This sometimes gradually diminishes, or suddenly disappears; when either soon afterwards, or not until several months subsequently, or even after a year or two, dangerous symptoms of diseased brain supervene, and rapidly advance to a fatal termination; and upon dissection, inflammation of the membranes of the brain of the same side of the body with the affected ear is observed, and in the substance of the hemisphere is found a large purulent collection with inflammation and softening of the cerebral matter surrounding it, the cavity presenting an irregular soft surface.

60. The following cases strongly illustrate this:—1st, A young gentleman had, from childhood, a

slight purulent discharge from the right ear, until nearly the period of puberty; about which time it gradually disappeared. He had nearly lost the sense of hearing on that side. He went into the public service, in which he continued for several years, until, about the age of thirty, he was suddenly seized with intense pain of the head, fever, followed by paralysis of the whole left side of the body, insensibility, involuntary motions, coma, shortly terminating in death. On examination, thickening of the membranes of the right side of the brain, with adhesions, softening of the cerebral structure, and a purulent collection nearly in the centre of the middle lobe of the hemisphere, were found. I very recently witnessed a nearly similar case, to which I was called by a neighbouring practitioner; and a third case, in which I had ventured to predict similar lesions in a person advanced in life, but which we were not permitted to verify by a *post mortem* inspection.

61. Abscess of the brain consecutively on purulent discharge from the ear, is most frequently observed in young subjects, particularly in those of a strumous diathesis. From what I have said, it must not be inferred that abscess of the brain is the only unfavourable consequence, or even the most frequent one, owing to an extension of the inflammatory action from the ear or cerebral membranes; for other lesions accompany it. But, whether the abscess proceed from a gradual extension of disease, as now stated, or be a vicarious result of the suppression of the external discharge,—in which light it may sometimes be justly viewed,—there are generally found, upon examination of the surrounding parts, increased vascularity, softening of the cerebral substance, and an irregular, soft, and vascular cavity, containing the purulent matter. Added to this, there are also inflammation, thickening, and suppuration of the membranes; the pia mater being injected, and covered with lymph; the dura mater thick, opaque, dark coloured, more readily torn, and detached from the bone underneath it, which is also discoloured, and sometimes carious.

62. Abscess of the brain is very often a consequence of external violence; but it is one which takes place at extremely indefinite periods from the receipt of injury, and which often has little or no relation to the extent of the external mischief. The period which elapses from the external violence to that full development of the abscess which is incompatible with the duration of life, according to the observations of PIGRAY, MORAND, PROCHASKA, THILENIUS, HOME, DENMARK, and others, varies from two or three months to as many years. A case which I had an opportunity of observing in a public institution, and in which the operation of trephining had been performed, presented a large abscess in the hemisphere, underneath the seat of injury, between three and four years from the time at which it had been sustained. The perforation made by the trephine was completely filled with ossific matter, which extended in a radiated manner from the edges of the perforation towards its centre.

63. Dr. BAILLIE says, that when suppuration of the brain takes place from internal causes, it is generally in the substance of the organ; but when it arises from external violence, it affects only the surface. But as Dr. CRAIGIE has very

justly remarked, this distinction does not always hold good, and requires modification.—“1st, Where a long interval elapses after the infliction of the injury, the collection of purulent matter is almost invariably deep-seated.” 2d, In like manner, when the injury operates in the manner of counterstroke, the collection is also often within the substance of the organ.” 3d, In some instances of suppuration after injury, the collection does not take place at the part where the blow struck the skull, but either in the line of the force passing through the brain, or in some of the lines into which this force may be resolved. 4th, It is chiefly when this force has been directly expended on the part, i. e. when the bone has been immediately broken, and its membranes injured, that suppuration takes place on the surface of the brain: it is then the result rather of the injury of the membranes, especially of the pia mater, than of the cerebral substance itself.

64. Suppuration may occur in any part of the brain; but it is most frequently met with in the hemispheres, as shown above (§ 60.). Its effects vary exceedingly, according to the situation and extent of the purulent collection; but are not essentially different from those which follow upon the slow effusion of blood, the presence of tumours, or other morbid formations. I have already hinted at the occurrence of suppuration in parts of the brain in the course of fevers, especially those which are of a malignant character, or which are complicated with inflammatory action of the brain. Such occurrences have been observed by PRINGLE, BORSIERI, EISFIELD, PLOUCQUET, CLUTTERBUCK, MARCUS, JACKSON, and MILLS, and many others. But this falls under the pathology of, and morbid appearances in fevers, where the subject has received due attention.

65. *C. Ulceration.*—To ulceration of the brain authors have attached no precise idea, they differing widely as to what should constitute ulceration of the cerebral texture. According to the opinions of some, those solutions of continuity, sometimes observed in the most advanced degrees of pulpy destruction of the brain, about to be described (§ 72.), are nothing else than ulceration; and certainly, if there were appearance of any considerable loss of substance by absorption, the lesion would be legitimately ulceration. The case recorded by MORGAGNI (*De Sed. et Caus. Morb. ep. xi. pars ii.*), in which he described the *corpus striatum ab reliquo cerebro omnino separatum inventum est*, which is so singular, may be referred to ulceration. By ulceration of the brain, Dr. CRAIGIE understands destruction of part of either of its surfaces, “so as to present a hollow or depressed surface, rough, irregular, and covered partially either with bloody or albuminous exudation.” This seems sufficiently precise; and excludes these doubtful cases of ulceration sometimes consequent upon effusions of blood, the advanced stages of softening of the organ, and the formations of abscesses existing in the substance of the brain, where, although a breach of continuity of structure is produced, yet the removal of it by absorption cannot be demonstrated. Cases of this description are more legitimately examples of pulpy destruction, or suppurative disorganisation, than of ulceration. With this limitation of ulceration and erosion to the various internal and external surfaces of the brain, M. ANDRAL

agrees with Dr. CRAIGIE. This species of lesion, although not of frequent occurrence, is yet occasionally met with. Besides the case given by MORGAGNI, and already referred to, another is mentioned by him in the same epistle. Instances of this disease have also been recorded by BONET (*Hist. Anat. Med. part iii. Ob. 108. 138.*), WEPFER (p. 212.), MORGAGNI (*Epist. Anat. Med. iv.*), LIEUTAUD, (*Hist. Anat. Med. let. iii.*), SENAC, VALSALVA, PORTAL (*Anat. Méd. t. iv. p. 98.*), HOWSHIP (*Med. and Phys. Journ. March, 1810.*), ANDERSON (*Transact. of Royal Soc. of Edinburgh, vol. ii.*), RIDLEY, HALLER, STOLL (*Ratio Med. pars iii. p. 122.*), POWELL (*Case 6. Transact. of College of Physicians, vol. v. p. 96.*), and SCOUTETTEN (*Archives Gén. t. vii. p. 31.*), who have met with it on the convoluted surface of the brain, on the foliated surface of the cerebellum, and in the surface of the ventricles,—parts in which this morbid change is chiefly found. As shown by HALLER (t. iv. p. 351.), STOLL, and SCOUTETTEN, ulceration of any part of the brain's surfaces is always attended with an inflamed, or otherwise unsound state of the pia mater, and occasionally with softening of the parts underneath, sometimes limited to the grey substance, but at others proceeding further. In the two cases recorded by M. SCOUTETTEN, the adjacent brain was somewhat softened, and in one of them, of a wine lees colour. The ulceration in the first case existed on the inferior surface of the right anterior lobe, and presented a hard, dry, irregular, yellowish surface, thirteen lines long and eleven broad, with singularly indented edges. This patient died with symptoms of irritation of the digestive canal, and of the brain. He experienced a constant acute pain at the bottom of the orbits. In the second case, the extremity of the posterior lobe presented two small ulcerated patches, one much larger than the other, and of an oval form. They penetrated no deeper than the cortical substance. This patient had been seized with gastro-intestinal irritation, and complained of no pain in the head. During the latter stage of his disease, he became delirious. In both these cases the surrounding pia mater was injected, and somewhat eroded; so that we may infer from these, and other cases upon record, that ulceration of the brain is a consequence of circumscribed inflammation of the pia mater.

66. The existence of ulceration of the brain is indicated by headach, partial convulsions, sometimes epilepsy, palsy, loss of memory, hebetude, coma, and exhaustion. In some cases the headach is intermittent, and the palsy is generally on the side opposite to that in which the lesion is found. In the case recorded by Dr. T. ANDERSON, and in which most of the symptoms now noticed were present, there was a superficial loss of substance from ulceration, two and a half inches long, one and a half broad, and nearly an inch in depth, situated on the upper part of the right hemisphere of the brain. In the bottom of this cavity were found some thin laminae of a brownish matter, with stony concretions, some of which broke into sand upon the slightest touch.

67. *D. Sphacelation or mortification* of the cerebral substance is rarely met with, and chiefly as a result of external injury, when it has been

bruised and acutely inflamed. In this state of disorganisation, the cerebral substance is dissolved, of an orange brown colour, or of a greyish black, and foetid. This alteration seems to be rarely produced by internal causes, and is to be distinguished from the pulpy softening of the organ. Dr. ABERCROMBIE, however, considers this latter change to be identical with gangrene.

68. ii. SOFTENING OF THE BRAIN.—A. From serous infiltration.—(*Edema of the brain*. Infiltration of the substance of the brain with a watery fluid has been noticed by GUERSENT and ANDRAL,—by the former in children, by the latter also in adults. In these cases the serum may be diffused in the nervous substance, or contained in more or less distinct cavities. This change is most frequently observed in the white central parts of the organ. It has not generally been remarked in connection with any particular symptom; but it has, in a few instances, co-existed with dropsy of the ventricles; and, in adult subjects, with general leucophlegmatia and cachexia.

69. B. Simple diminished consistence of the brain, without change of structure, — *Mulakencephalon* (CRAIGIE), — seems to be a different state of the organ from that which constitutes the *ramollissement*—softening, or pulpy destruction of the brain. In this latter more or less disorganisation is manifest, and generally some change in its colour; but the former is merely diminished consistence, greater flaccidity, and decrease of its natural firmness, toughness or tenacity, and of that clamminess or viscid feeling which it usually communicates to the touch. This state is commonly attendant on low or malignant fever, and on chronic diseases, particularly pulmonary affections, marasmus, diabetes, dropsies, mesenteric and visceral affections. It generally affects the whole organ, and, indeed, the whole cerebro-spinal axis; whereas the pulpy destruction of the brain is more or less limited in extent, affecting parts of the organ in a particular manner.

70. In *dropsies*, the brain is often flaccid, more easily lacerated, and of diminished consistence throughout. This state proceeds either from diminished nutrition of the organ, or from an interstitial deposit of serous fluid with its minute atoms, and defective vital cohesion of its substance. The proper texture of the part is not otherwise changed. *Diabetes* sometimes occasions a similar state, and most probably from diminished nutrition added to a deficient vital cohesion of the structure. In *pulmonary consumption*, and in chronic bronchitis, the brain is very commonly found softer than natural throughout; and this softness is the more marked, the more chronic the pulmonary affection has been, and the more complete the emaciation. May not this state be considered as analogous to emaciation of other parts? the molecules of matter removed by interstitial absorption of the texture of this organ being replaced by a serous effusion, owing to the cranium being a shut cavity, which must necessarily, during the life of the subject, always be in a state of repletion. In such a case, the density of the brain is actually diminished. MECKEL states, that he found a cube of six lines, taken from the brain of a man dead of phthisis, $\frac{1}{4}$ grain lighter than the same bulk of a sound brain. Dr. MORRO has found the brains of condemned felons extremely soft, particularly inter-

nally, (*The Morbid Anatomy of the Brain*, vol. i. p. 35. and 100.). LITRE, however, states, that the brain of a felon, who committed suicide, was extremely dense and firm, (*Histoire de l'Académie Royale des Sciences*, Ann. 1705.) TULPIUS, KERKINGIUS, KING, SCHEIDE, MORGAGNI, GRENING, &c. have found the brain frequently soft and flaccid in fatuous persons, as well as in epileptics, and epileptic maniacs. GRENING (*On Ludwig's Adversaria*, t. ii. part iii. p. 533.) found in about one half of the last named class of subjects, the brain very soft throughout, particularly in its central parts; and Dr. HASLAM's observations (*Observations on Madness and Melancholy*, 2d edit. Cases, 4, 10, 18, 25, 28, 30, 37.) in some degree confirm these statements. But it should not be overlooked, that the brain of epileptics and maniacs is found also more than usually firm. The diminished consistence of the brain of condemned felons has been attributed to confinement, inactivity, and low diet. Whether these may have a greater influence in causing it than the mental distress to which these persons are reduced, it may be difficult to determine; but if the former be the cause of this state of the organ in felons, it may be equally so in maniacs, who are generally also subjected to confinement and low diet. The diminished consistence now described, is more or less universal, although more remarkable in particular parts, and it generally affects the whole cerebro-spinal axis. Whereas the morbid softening, or pulpy destruction, about to be described, is generally limited in extent. The former also seldom presents any very sensible change from the natural colour of the part; whereas with pulpy destruction there is a more or less evident discoloration.

71. C. *Pulpy Destruction*, — *Softening*, — *Ramollissement*, — *Encephalitis sub-acuteus*, — *Cerebritis sub-acuteus et chronicus*. — Softening of the substance of the brain has generally been ascribed to a sub-acute inflammatory action, especially by MORGAGNI, ROSTAN, LALLEMAND, BOUILLAUD, PINEL, OLIVIER, and VILPEAU, to whom we are chiefly indebted for having directed attention to this particular lesion. There are others, however, as RECAMIEN, who consider this change as the effect of a morbid nutrition of the part, rather than as a result of inflammatory action. By softening of the brain, must not be understood that soft state of the organ which is always present in early infancy, nor the less consistent state of the organ sometimes observed in some chronic diseases, and in certain forms of fever, and already described. It should also be recollected, that all parts of the brain possess not the same degree of firmness; for, if the mesocephalon be as soft as a lobe of the cerebellum, it is undoubtedly in a morbid state.

72. Softening of the brain presents various degrees. The least change of consistence of the part can be recognised only when it is touched. In a more advanced degree, the softening is obvious to the sight. In a still farther advanced grade, the cerebral substance is nearly liquid, and has almost entirely lost its organisation; and in its place there is a mere loose cellular substance, soft and gelatinous, appearing as the original matrix of the structure; and in the last and most advanced stage of all, there is a perfect dissolution of the part, and breach of continuity.

In the cases of this description published by MM. RULLIER and VELPEAU, the disorganisation was so complete, that the filaments of the delicate cellular substance, forming, as it were, the matrix of the structure, were suspended in the middle of the diffuent matter into which the cerebral substance was changed. In the case observed by M. VELPEAU, the solution of continuity was still more complete. From the inferior margin of the mesocephalon to the base of the pyramidal bodies, a substance entirely liquid, which no longer retained the appearance of nervous substance, occupied the place of the bulb of the chord; and through the whole of this space there existed neither arachnoid nor pia mater.

73. The softened portion of brain presents various shades of colour. 1st, It may be of the natural or healthy colour of the part, — even although the softening has advanced to such a degree as to form a diffuent pulp, (ANDRAL, LALLEMAND). 2d, It may be perfectly colourless; or of a dull white resembling milk; and occasionally the whiteness of the part assumes a clear, or brilliant hue. 3d, The shades of colour sometimes are the following: — a rose tint, an amaranthine red, reddish brown, the colour of wine lees, violet, yellowish, greenish yellow, light grey, and dark grey. Besides the above appearances, the softened part of the brain may be, — 1st, The seat of effusions of blood, which are sometimes small, relatively to the degree of softening, or to its extent; at other times very considerable compared with the softening itself: 2d, Pus may be infiltrated throughout the part which is softened; or the pus may exist in it in the form of one or more distinct collections. M. LALLEMAND considers, that in all softenings of the brain of a white colour, this appearance is owing to the infiltration of purulent matter through the softened structure. MM. ROSTAN and ANDRAL espouse an opposite opinion, on the grounds that, in many softened portions of the brain of this shade, no pus could be detected. The softened part of the brain is generally inodorous; but M. BILLARD has remarked, in the case of an infant, the smell of sulphuretted hydrogen. Softening, attended with the odour observed by this author, seems to have constituted what was called by the older writers, gangrene of the brain.

74. There is no part of the brain or cerebellum in which softening has not at some time or other been detected. Generally those parts which are most obnoxious to hæmorrhage are most liable to softening, such as the optic thalami, and the corpora striata, and the parts in their vicinity. It also as frequently affects the cortical substance, as the medullary texture. In the cerebral hemispheres, the softening may be seated in the cortical substance of the convolutions, the white medullary structure remaining unchanged, where it may often escape detection, owing to such limitation; and it is usually an attendant upon active inflammation of the membranes of the brain. When the grey part is softened, it generally separates along with the pia mater, on attempting to raise this membrane. When softened, this portion is commonly also redder than natural; sometimes, on the contrary, it is paler than common. The medullary structure situated above the lateral ventricles is very often the seat of this species of lesion. This mass may be altogether softened,

or in a few small points merely, each point being quite isolated from the other. The symptoms, however, resulting from this smaller extent of morbid change may be as severe as those arising from the more extensive and more intense lesion. When one of the hemispheres is softened near to its external surface, the circumsolutions are flattened, and often evince a species of fluctuation. M. ANDRAL has remarked, in some cases, the existence of softening of the parietes of the ventricles, with the presence of a turbid fluid effused into them, (*Anat. Pathol.* t. ii. p. 802.)

75. The optic thalami, the striated bodies, and parts in the vicinity of these; the cornu ammonis, and the eminences in the interior of the digitated cavities of the lateral ventricles, the commissures of the hemispheres (*corpora callosa, septum lucidum, &c.*), have all been observed the frequent seats of softening; sometimes limited to one or other of them only, at other times extending to two or more, and occasionally co-existing with signs of inflammatory action, or with effusion of a serous fluid into the ventricles. Softening of the other parts of the encephalon is not so often met with, as of those now enumerated; yet has it been seen in the mesocephalon, in the various parts of the cerebellum, in the medulla oblongata, and spinal chord.

76. Softening of the brain may be limited to one part, or it may exist in several parts, even in both hemispheres, in the same case; and it may affect these different parts at the same time, or successively, either as respects the brain merely, or as regards the whole cerebro-spinal axis. Instead of being partial, which is its usual form, the softening may be so general, and to so intense a degree, that the brain is almost reduced to a pulpy matter, evincing scarcely any appearance of organisation. So general and great a change is very rarely met with in the adult; but it is occasionally observed in infants. M. BILLARD has met with ten instances of it, and I have also found it in some cases of young children: the odour of sulphuretted hydrogen, first noticed by M. BILLARD, was sensible in these; and he found it present in all his cases, which were chiefly of infants only a few days old.

77. Softening of the cerebro-spinal axis is met with in patients of all ages. According to M. ROSTAN (*Récherches sur Ramollissement du Cerveau*, 2d edit. p. 155.), whose attention has been directed, at the Salpêtrière, to this lesion in a special manner, it is very common in old subjects; even more so than sanguineous apoplexy. The researches of LALLEMAND, ANDRAL, and others go to confirm this opinion, and to show that it is also common during early and middle age, although less so than in old age. And I perfectly agree with M. BILLARD in considering it common in children, especially infants. He believes, and I think with justice, that it commences in some cases even before birth.

78. There still remains an important question to be discussed, namely, what is the origin and nature of the softening which has now been described? M. LALLEMAND conceives that it is a constant and necessary result of an acute, sub-acute, or chronic inflammatory irritation of the part. M. ROSTAN, who has examined this subject with great care, and viewed it in various lights, as respects both the morbid appearances

and the symptoms accompanying them, concludes at last by confessing its difficulty, and considering this change as analogous to senile gangrene. Before the question can be entertained with precision, we should previously enquire with what other morbid states of the system generally, and of the brain in particular, has softening been found allied? 1st, It has been observed by JEMINA, BLACK, myself, and others, to supervene during fevers, especially those of an epidemic and malignant character. 2d, It has been seen connected with puerperal disease of a malignant nature; and with epidemic and infectious erysipelas. 3d, It has been found in cases of scorbutus, and to occur in persons of an unhealthy and cachectic habit; also in those whose powers of life have been exhausted by bad living and excesses.

79. As to its relation to other lesions of the brain, I may state that it is often found surrounding *extravasated blood* in the brain, and intimately connected with this effusion. The softened part is then generally of the colour of wine lees, of a brownish hue, sometimes tending to green, or of a grey or ash tint. But what is the nature of this connection? M. ROSTAN contends, that the softening precedes and is always the cause of the effusion, owing to the destruction of the minute capillaries at the point where the softening is greatest; whilst Dr. CRAIGIE and others consider the softening surrounding the effused blood as the consequences of such effusion; and chiefly because, "in cases in which death takes place early, the pulpy disorganisation is less complete than those in which it takes place at a later period. In short, the extent of the disorganisation is proportionate to the interval which elapses between the effusion of the blood and the period of death." But is this the fact? It certainly is not in accordance with my experience, for I have observed no such relation; but have found recent effusions surrounded by as great, and even a greater, extent of softening as effusions of an older date.

80. Pulpy softening may be the attendant upon a *coup de sang*, or sudden congestion of the venous capillaries of some part of the brain. This is considered to be the case in softenings with the reddish, amaranthine, crimson, or reddish brown shades of colour. But is the softening a consequence, or a cause of the injection? May it not be a state of the vessels preceding that of effusion? These are questions which large experience and deep thought will not readily decide. Dr. CRAIGIE thinks that the softening is a consequence of the blood-stroke; but I cannot agree with him, merely because the reasons for a contrary opinion are quite as strong as those which may be urged in its favour. It has been often found accompanying hydrocephalic effusions, by ROSTAN, LALLEMAND, BILLARD, OTTO, ANDRAL, and by the author. It is then generally of the lighter shades of colour, and not great in degree. Is it here a consequence or a cause of the serous effusion? It may be either. I am more inclined to consider both lesions as being often coeval, and, whether consecutive or not, depending upon a similar state of the vessels and vital manifestations of the organ and system generally.

81. Softening, or pulpy destruction of a portion of the brain, has likewise been found sur-

rounding tumours and abscesses, by MORGAGNI, SANDIFORT, MECKEL, LALLEMAND, BLANE, YELLOWLEY, POWELL, &c., and presenting almost every variety and depth of shade already noticed. In these cases, especially in those where purulent matter is lodged in the substance of the brain, without any intervening cyst or membrane, the softening often amounts to disorganisation, and is more clearly attributable to inflammatory irritation. When it is found subsequently to injury of the brain, external violence, and inflammation of the brain and its membranes, its nature and origin are most manifest. That it does supervene in this way, is shown by FANTONI, MORGAGNI, LE DRAN, SCHMUCKER, O'HALLORAN, DEASE, ARERNETHY, THOMSON, HENNEN, ARERCROMBIE, and others. The apparently unequivocal origin of this lesion in inflammation, under these latter circumstances, induced MORGAGNI, LIECTAUD, JEMINA, and more recently BAILLIE and ARERCROMBIE, to consider it as analogous to gangrene in other structures.

82. But it should be kept in recollection that this state of the cerebral structure, although often preceded by signs of inflammation, and exhibiting in the parts surrounding it inflammatory appearances, is often neither preceded by the one, nor accompanied by the other, but, on the contrary, with a directly opposite train of phenomena and state of parts. In these opposing cases, what is the origin of the disease? Are we to infer, with RECAMIER, an entirely opposite origin to that of inflammatory action, and that, as the softenings observed in the brain betray a variety of characters, therefore they ought not strictly to be referred to a single unvarying source?

83. From what I have seen of, or read concerning, this lesion, I should infer, in respect of either of its most manifest conditions, that it is an effect of different states of morbid action, but most frequently of a form of sub-acute inflammation, characterised by deficient power and loss of the vital tone and cohesion of both the vessels and the substance of the brain, — that it is the result of deficient vitality of the extreme capillaries and cerebral structure, occurring either primarily, or in consequence of previously excited action. The circumstances in which it is observed; its occurrence after injuries and bruises, from the pressure of tumours, &c., and during the progress of malignant diseases, show that it is not produced by a sthenic or healthy form of inflammatory action; but by that unhealthy, disorganising and diffusive kind observed in cachectic habits, or in persons whose vital powers are much reduced. At the same time, I think it cannot be denied, that it sometimes originates in a different way, being preceded by no signs of inflammatory irritation, nor attended with inflammatory appearances, and is a simple consequence of diminished, or altogether lost, vital power and cohesion of the part affected.

84. iii. HÆMORRHAGE. — *Sanguineous effusion* may occur in a primary form, but more commonly from some morbid state of the vessels, or of the substance of the brain itself. It may take place in any part of the organ, but much more frequently in some situations than in others. a. Blood is effused on the external surface of the brain, either in small quantities, beneath the pia mater, in one or two anfractuosities; or in an

uniform layer, even extending over the whole of an hemisphere in rare cases. *b.* It is sometimes found in large quantities in the ventricles; but it generally has escaped into them, owing to laceration of the cerebral substance in which the extravasation takes place. *c.* The hæmorrhage most frequently is in this substance. M. ANDRAL states, that in 392 cases of hæmorrhage in the brain, its actual seat was in some part of the cerebral substance in as many as 386. Of these, 202 occurred in the *corpora striata*, and *thalami optici*, and parts in the hemispheres, on a level with these places. The cavities formed by the extravasated blood vary in size, from that of a small pea, to the greater part of the extent of a whole hemisphere. When the effusion is very large, it generally ruptures the parietes of the lateral ventricles, sometimes tearing the septum lucidum, and destroying the fornix. In other cases it may make its way to the exterior of the brain, and spread itself over the cavity of the arachnoid.

85. The number of hæmorrhagic cavities found in the brain vary from one to many. When several are found in the same brain, they generally present different appearances, owing to their having been formed at different periods. This is generally the case when the patient has experienced several attacks of apoplexy or palsy. M. ANDRAL remarks that effusion of blood seldom occurs in the cerebellum without appearing also in the cerebrum, whereas it may take place in any part of the cerebral hemispheres without occurring elsewhere. I have stated in the article on APOPLEXY, the periods of life at which hæmorrhage in the brain is most frequently met with. Instances have occurred to M. M. ROCHOUX, BILLARD, SERRAS, GUERSENT, and myself, in which it has taken place at the unusual periods of infancy and childhood. The changes that take place in the effused blood, in the cavity containing it, and in the substance of the brain after hæmorrhage, comprising the reparative processes consequent upon it, are fully described in the article APOPLEXY (§ 35—39.). I have there shown that the cysts remaining after the coagula have been absorbed, sometimes disappear altogether by adhesion of their parietes. Some pathologists suppose that the cerebral fibres in those cases are directly united, and refer to the experiments of FONTANA, HAIGHTON, MICHAELIS, and MAYER, who had shown, in opposition to ARNEMANN, that the filaments of divided nerves are, after a time, directly produced in the direction of their axis across the cicatrix. But intimate examination of the cicatrix of a lacerated portion of brain, or of a hæmorrhagic cyst, shows that this does not take place in the medullary structure of the brain. (See APOPLEXY, § 53.)

86. iv. HYPERTROPHY AND ATROPHY OF THE BRAIN. — *A.* The brain occasionally presents lesions evidently connected with a modification of the nutritive process. In such cases, the consistence and size, either of the whole, or of certain of its parts merely, are altered. Changes of its consistence are more frequent than of its size, and both are occasionally conjoined. It should not be overlooked, however, that the consistence and size of the organ are modified from the usual standard of middle age, at both the earliest and most advanced epochs of life; and that these

modifications, as being its natural conditions at those terms, are to be distinguished from the alterations occasioned by disease. One hemisphere may also differ from the other, in respect both of its volume, and the form and size of its convolutions, owing to original conformation, without occasioning any appreciable disorder of function.

87. The brain continues to increase in size until manhood; from this period until old age its volume continues the same; but with extreme age it somewhat diminishes in bulk. This is, however, not an uniform occurrence, for disease may have cut short existence before the period had arrived at which the organ would have undergone this change. According to CAZANVIELLE, the longitudinal diameter of the brain of an old man, compared with that of one in early life, is 6 inches 1 line French measure for the former, and 6 inches 4 lines for the latter; whilst the transverse diameter is 4 inches 10 lines, and 5 inches, respectively. M. DESMOULINS (*Anat. des Syst. Nerv. &c.* t. ii. p. 620.) found, that in persons above seventy years of age, the specific gravity of the brain was from one twentieth to one fifteenth less than that of the brain of persons just arrived at manhood.

88. The convolutions of the brain are scarcely developed at birth, or even until the expiration of the first year. In old age they again become less distinct and prominent. In the brain of the full grown young subject, they vary in thickness from three to five lines, whilst they are usually about two or three lines in old persons. They present the greatest diversity in respect to their number and length, and the depth of their anfractuosités in the adult: in general they are the most marked and developed in the largest brains. Several physiologists in France are of opinion that the development of the faculties of the mind has a very intimate relation with the extent and number of the convolutions of the hemispheres, and the depth of their anfractuosités.

89. But it is important for the physician to know that not only may the whole encephalon experience a diminution of its bulk and specific gravity with old age, but that this diminution may be particularly apparent in certain parts of it in preference to others; and it is presumed, that this change may sometimes commence in one portion previously to others, or may affect it alone, so as to disturb its functions without being so evident upon dissection as to attract notice. The comparative length of the following parts of the encephalon of subjects just arrived at puberty, of those in the prime of life, and of aged persons, is here given, as furnished by M. CAZANVIELLE in French measure:—

| Persons at Puberty. | | In the Prime of Life. | | In Old Age. | |
|-----------------------|-------------|-----------------------|------------|-------------|------------|
| | in. lines. | in. lines. | in. lines. | in. lines. | in. lines. |
| <i>Thal. optici</i> | 1 5½ | 1 6 | 1 4½ | | |
| <i>Corp. striata</i> | 2 6 | 2 6 | 2 4½ | | |
| <i>Corp. callosum</i> | 3 4½ | 3 5 | 2 7 | | |
| <i>Mesocephalon</i> | length 0 10 | 0 11 | 0 10½ | | |
| | breadth 1 0 | 1 1 | 1 0 | | |
| <i>Cerebellum</i> | length 2 2 | 2 3 | 2 3 | | |
| | breadth 3 9 | 3 9 | 3 9 | | |

90. From these data it will appear, that the cerebellum is the only part of the encephalon which is not diminished by old age. But it may be asked, do the large nervous masses experience

any diminution of volume analogous to that which the muscular textures and other parts experience in chronic diseases? In answer to this, M. DESMOULINS states that the brain, although atrophied in the manner stated above by old age, suffers no diminution of its bulk, whatever may be the degree of marasmus to which the individual may have been reduced. In all such cases he has also found the brain of the same specific gravity; and, to this predominancy of development which the brain thus has acquired over all other organs, he is inclined partly to impute that nervous susceptibility and excitation, which are common to the last stages of those maladies. It ought, however, to be borne in recollection, that, although the nervous centres may not undergo any change in bulk or specific gravity in consequence of those diseases, they often experience a very marked diminution of their consistence, as we shall have to show in the sequel. Having been made acquainted with these modifications of the nutrition of the encephalon which it undergoes at the different epochs of life, we are the better able to recognise those which are the result of disease.

91. *B. Hypertrophy, or morbidly increased bulk of the brain*, is very rarely met with. This state of the organ is to be distinguished from the apparently augmented bulk, arising either from increased vascular action, or congestion of the vessels. It appears to consist of an actual increase of the molecules of matter composing the proper tissue of the organ, and not of an injection of the minute vessels distending its structure. Although this condition of the brain seems to have been known to MORGAGNI, it is to LARNEC that we are indebted for precise information respecting it. He stated (*Journ. de Corvisart*, &c. t. ii. p. 669.), that, upon opening the heads of patients who had been thought to have died of hydrocephalus, he found no fluid effused; but the brain presented appearances of great compression, which he could attribute to no other cause, than to a too active nutrition of its structure, giving it a bulk too great for the bony case containing it. In children especially, who had died in convulsions, or who had been subject to epilepsy, this disproportion between the capacity of the cranium and the bulk of the encephalon has been witnessed by him on several occasions, the convolutions of the hemispheres being flattened, and apparently squeezed against each other. M. DANCE has also described this state of the brain (*Repertoire d'Anatomie*, t. v. 1828.), and furnished some cases in which it was observed. It is chiefly met with in children or young subjects, and is, I conceive, of very rare occurrence, since, from amongst the great many thousand cases of children's diseases which have come before me, I have only remarked three cases in which it was unequivocally present. In these it presented the following characters:—The convolutions of the hemispheres were extremely flat, and closely pressed against each other, so that the separations between them were scarcely apparent. The cerebral structure was firm, and, when incised, was dry, and more than commonly destitute of blood. The ventricles seemed small, were closely pressed together, and almost dry. The bones of the cranium were either natural or thicker than usual, as if they had participated, as regarded their thickness, in the increased nutrition

of their contents: the dura mater adhered closely to the cranium. A similar augmentation of the thickness of the cranial bones, but to a greater degree than I have remarked, has been recorded by M. SCOUTETTES, who met with it in a girl five years of age, who died of abdominal disease, and who had never complained of any disorder of the head, or of disturbance of the mental faculties, which were those common to children at her age.

92. *Rickety hypertrophy* of the brain is more frequent. It commences soon after birth, and often attains a great extent. OTTO supposes that brains which have been much expanded by dropsy in youth, become subsequently, in rare instances, cured by increased deposition of cerebral matter; and thus retain their size and weight. The distension of the cerebral substance by the accumulation of fluid in the ventricles, cannot be comprehended under hypertrophy of the organ.

93. M. ANDRAL (*Anat. Path.* t. ii. p. 776.) says, that, although hypertrophy of the brain is usually general, and extends to the whole of both hemispheres, it is sometimes also partial: thus he has seen the *thalamus opticus* of one side of its natural dimensions, whilst that of the opposite side was one fourth larger. This extraordinary development of the thalamus of one side was not attended with any particular symptom during the patient's life. OTTO refers to a number of cases of hypertrophy confined to a single part of the brain, chiefly to the *thalami* and the *corpora quadrigemina*. I am not aware that any well authenticated cases of marked hypertrophy of the *cerebellum* are upon record. The *spinal chord*, however, is not infrequently subjected to this change.

94. Morbid enlargement of the *pineal gland* has been observed by DRELINCOURT, MORGAGNI, LIEUTAUD, DESPORTES, SOEMMERING, ANGELI, GREYING, MECKEL, and BLANE. The *pituitary gland* has also been found enlarged, inflamed, and otherwise changed, by GREYING, BAILLIE, CHAUSSIER, OPPERT, WARD, RULLIER, DE HAEN, RAYER, NEUMANN, ABERCROMBIE, OTTO, the WENZELS, and MECKEL.

95. *C. Imperfect development and atrophy of the brain*.—*Agenésie cérébrale* (CAZANVILLE),—is met with in every degree, from a slight diminution of the usual bulk of the whole organ, or of any of its parts, to their almost entire disappearance. Atrophy, although occurring in all situations of the cerebro-spinal axis, is most frequently observed in those which are the last formed: thus the spinal chord is formed before the brain, and atrophy of it is much rarer than that of the encephalon. Of the brain, the convolutions are the last developed, and they are most frequently atrophied. It should, however, be noticed, that the majority of those cases which are denominated atrophy of the brain by ANDRAL, and other French pathologists, are, strictly speaking, imperfect or arrested development of the organ. The hemispheres are most frequently the seat of atrophy and imperfect development; and they may be thus affected, either partially, or altogether. Imperfect growth of particular lobes, especially the anterior, is common in idiots, and may exist even although the cranium is well formed, the void being filled up with water, the congenital effusion of which is the probable cause of the arrest of development. When the hemispheres are par-

tially affected, the lesion is most commonly observed in the convolutions.

96. *a. Atrophy of the convolutions.*—These parts are sometimes only smaller and less numerous than usual, either in respect of one or both hemispheres, or in a portion of a hemisphere merely; and they may be altogether wanting in one, or in both. M. JADELOT lately found the hemispheres of the brain of an idiotic child, aged six years, without convolutions, and consisting of an uniform layer of medullary substance covered by a thin coat of cineritious matter.

97. *b. Sometimes the greater part of the hemispheres of the brain, especially their superior portions, from the vault of the ventricles upwards, are found in a state of atrophy, or altogether wanting.* Most of the cases of this description, which have been adduced by the French pathologists, as well as the case of JADELOT, are merely instances of imperfect development of the part. Sometimes this portion of the encephalon is replaced by a sac containing a serous fluid, having no communication with the ventricles. In other cases, no such body replaces the deficient hemispheres; but the different parts of the anterior and superior aspect of the ventricles, as the thalami optici, corpora striata, &c., may be seen through the membranes, no substance intervening between them and those portions of the floors of the ventricle. These occurrences are, however, not cases of atrophy, but of arrest of the formative process as respects the hemispheres of the brain. Cases of diminished size merely, of one or both hemispheres, are more common than those now instanced; and are generally to be considered as being congenital; or, at least, the result of a diminished nutrition of the part, in the process of the growth of the organs. Instances of extreme smallness, or an entire absence of a part of the hemisphere, are most frequently met with in its posterior or anterior lobes: either of which may be altogether wanting in one or both sides of the brain. Diminished size of the anterior or posterior lobes are a much more frequent occurrence than their entire absence.

98. *c. The thalami optici, and corpora striata, may be also much diminished in volume, either singly or together.* The diminution may proceed from a defect either of the grey matter, or of the white substance; and from this cause of diminished bulk, the accompanying symptoms will derive their chief characters. Not only may those bodies be simply diminished in volume, they may be even altogether wanting, either being replaced by a serous cyst, or having no other body as a substitute: in the former case, the hemisphere of that side may be, or not, also entirely wanting; in the latter it is always absent, and, from the cerebral peduncles, nothing more is found than a few scattered fibres, which are spread out into a membranous tissue, resembling that which, at the earliest epochs of foetal existence, forms the rudiments of the hemispheres. It is evident, that in such cases, the white central portions of the brain being absent, and both sides of the cerebrum being thus circumstanced, there can scarcely be said to be any brain in existence. This, however, does not prevent the other parts contained within the cranium, as the mesencephalon, cerebellum, &c., from being fully formed.

99. *d. The central white parts of the brain may be imperfectly developed, even when no*

alteration is remarked in the hemispheres. In some such cases the corpus callosum is so small as to form merely a thin membrane. REIL remarked its entire absence in a female idiot, who died at thirty: the two hemispheres communicated only through the medium of the anterior and posterior commissures. It is remarkable, that when the cerebral lobes are wanting, two small masses of nervous substance, whence the olfactory nerves arise, are sometimes found in the anterior part of the cranium; thus displaying in man, in the morbid state, the independent existence of the olfactory lobes, naturally shown in animals.

100. It will be seen from the above, that all the parts of the brain may present a state of imperfect development to a greater or less extent; that either of them may be entirely wanting, while the others remain; and that all of them may be absent, so that there exists no brain: a circumstance not infrequently observed in fetuses, and evidently owing to the process of development having been suddenly arrested.

101. But not only may the brain be in part, or entirely, deficient at birth; it may be also remarkably small at advanced age, particularly in idiots. It may be generally, but more frequently only locally, diminished by external pressure, as in meningeal hydrocephalus. Although the brain, as well as the other parts of the nervous system, wastes so little in general consumption, it is, however, somewhat diminished, although rarely, in the course of certain diseases: SAVARUS states, that he has found it atrophied in yellow fever. HORN remarked a similar state in diabetes; and OTTO, after venereal excesses. Atrophy is, however, more frequently observed in particular parts of the brain. The lateral lobes of the cerebellum have been occasionally found atrophied. M. HUTIN observed the medullary centre of the cerebellum reduced one third of its natural size. MORAGANI, WENZEL, and BIERNAYER have described atrophy of the corpora striata. The optic beds have been found greatly reduced in size after blindness, by SOELMEHING, MICHAELIS, RUDOLPH, &c.; and in idiots, by OTTO, RAMSAY, and ROMBERG. The quadrigeminal bodies, and the tubercles of the brain, have likewise been severally found atrophied. The pressure occasioned by tumours, collections of lymph, pus, or blood, or even dropsy of the ventricles, may give rise to atrophy, interstitial absorption, or destruction of particular parts of the brain. The want of exercise of the functions of the nervous system may also occasion atrophy, by diminishing nutrition, as an unexercised muscle soon wastes. Thus, the wasting of the brain so generally observed in idiots, may be the effect and not the cause of idiocy. The pineal gland, and the pituitary gland or appendage of the brain, have both been seen remarkably atrophied, particularly the latter. According to OTTO, this change has been most frequently remarked in idiots, and in hydrocephalic cases.

102. *v. INDURATION, OR HARDENING OF THE BRAIN, — Sclerencephalia (CRAIGIE).*—The cerebro-spinal axis sometimes presents, either throughout its extent, or in particular parts, a remarkable increase of consistence. This increase varies in grade. In its first degree, it is nearly of the consistence of a brain which has been kept some

time in dilute nitric acid. The *second degree* of increased hardness resembles the consistence of cheese. In this state, the cerebral substance, when exposed to the action of fire, instead of swelling up, without emitting any marked odour, and leaving a brownish light residue, assumes a horny hardness, emits a strong heavy smell, and leaves a compact blackish residue. Nitrous acid also imparts to it a horny hardness, — circumstances evincing a great increase of the albuminous constituent of the structure. The *third degree* of hardening equals the firmness of wax, frequently also conjoined with elasticity, so that the indurated portion resembles fibro-cartilage.

103. *a.* The first grade of induration may affect the whole or the greater part of the cerebro-spinal axis. The two greater degrees of this change are commonly of more or less limited extent. *General hardening* of the brain is usually attended with augmented vascularity, numerous drops of blood becoming effused when the cerebral structure is incised. This increased vascularity, although general, is not constant; for, in some few instances, little or no injection of the capillaries is observed, the brain being rather exsanguineous than vascular. Even in the general induration of the brain, the hardening is not equal throughout every part. It is least remarkable in the cortical structure and convolutions; and more manifest in the white, particularly the central medullary parts, than in the grey substance.

104. *b.* *Partial induration* of the brain is most frequently found in its central parts, and sometimes in the convolutions. M. ANDRAL has observed it in this latter situation, at as early an age as three years, which is extremely unusual. Sometimes the convolutions of the convexity of the hemispheres are unaltered, whilst those of the base are hardened; occasionally, in such cases, especially when the induration is considerable, the cortical can scarcely be distinguished from the medullary structure. In a case recorded by LALLEMAND, the induration was limited to a circumscribed portion of cortical substance, and, under it, the medullary texture was manifestly softened. M. PINEL found, in one of the hemispheres of a female who had died in a state of idiocy, a portion of the medullary structure extremely hardened; and, in the same individual, there existed, in the whole posterior and inferior border of the cerebellum, an induration of a fibro-cartilaginous description. The hardened portion was yellowish, elastic, resembling a piece of whitish yellow leather. Mr. PAYEN found, in a girl six years of age, near the posterior third portion of the left hemisphere of the brain, a depression, owing to hardening of one of the convolutions, which seemed externally as if it were shrivelled. It was rose-coloured on its surface, slightly yellowish in its substance, and almost concealed from view by two convolutions, which were healthy. The membranes covering this hardened convolution were white and thickened. Hardening was here joined to diminution of volume; or, perhaps, the disease of this portion of the brain was congenital, and, whilst the growth of the rest of the organ had proceeded, the development of this was interrupted. The intelligence of this child was well advanced; but she had, from birth, a contraction of the right wrist and foot, with slight atrophy, and incomplete

hemiplegia of this side. Similar cases of hardening of portions of the lobes of the brain are described by MONRO, LALLEMAND, and HUTCHINSON. In a case recorded by JOBER, the induration was limited to the parietes of the posterior cornua of both lateral ventricles, and amounted almost to that of cartilage. BEROMAN found both optic beds hardened in a paralytic and squinting girl: and CASTELLIER and ANDERSON observed excessive hardening of the lobes of the cerebellum. Partial induration of the nervous centres frequently co-exist with other lesions of those organs, especially around old sanguineous effusions and morbid productions formed in the cerebral substance: they are also occasionally found accompanying the usual results of chronic inflammation of the membranes; these being firmly agglutinated together, to an extent of surface more or less considerable, and closely adherent to a subjacent hardened portion of brain. (PORTAL, *Anatomie Méd.* t. iv. p. 91.)

105. *Cause of hardening of the brain.*—The first degree of induration has been frequently found in persons who have died of fevers, generally of an ataxic or typhoid type, and in maniacs. M. ANDRAL observed it in two patients afflicted with convulsions from working in lead. MM. GAUDET (*Recherches sur l'Endurcissement gen. del' Encéph. comme une des Causes des Fièvres Ataxiques.* Paris, 1825.) and BOUILLAUD (*Archives Génér.* t. iii. p. 477.) consider it as the consequence of acute inflammatory action of the brain and its membranes, they having found it in persons who have died of encephalitis occurring either primarily, or as a complication in fevers; and M. ANDRAL (*Anat. Path.* t. ii. p. 810.) seems to coincide with this opinion. RUDOLPHI observed it in thirty cases of typhus: and OTTO found, during the epidemic typhus of 1809 and 1812-13, hardening of the brain frequent in those who died within the first week; and softening in many who died at a later period. But, in these cases, granting the induration to have been the consequence of the disease which destroyed life, it must have taken place in the short space of a very few days; whereas, I am much more inclined to impute it to inflammatory action of a lower grade and of a much slower progress. M. BROUSSAIS regards it as the result of meningo-encephalic inflammation, of a sub-acute or chronic nature. As being generally found in connection with increased vascularity of the substance of the organ, and with this and other signs of inflammatory action of the membranes, the relation of this change to inflammation seems established; but I am inclined to adopt the inference of Dr. CHAIGIE, in respect of the opinions of MM. GAUDET and BOUILLAUD, that, in those cases in which they observed this lesion, it had existed previous to the acute disease which occasioned death.

106. Induration of the brain has been long familiar to pathologists, in relation to mental derangement. The writings of LITTRE, GEOFROY, BOERRHAAVE, LANCISI, MORGAGNI (*Epist. Anat. Méd.* viii. 4—18.), J. F. MECKEL (*Mém. de l'Acad. Roy. de Berlin*, t. vii. p. 306.), LIEUTAUD, SANTORINI, GRENING (*Ludwig's Advers. Med.-Pract.* t. ii. pars 3. p. 533.), PORTAL, MARSHALL (*Morbid Anat. of the Brain*, &c. Lond. 1816.), HABSLAM (*Observ. on Madness and Melancholy.* Lond. 1809.), SERRES (*Ann. Médico-*

Chirurg. Paris, 1819.), LALLEMAND (*Récherches Anat. Path.* let. ii.), LERMINIER, BOUILLAUD (*Traité Clinique de l'Encéphalite*. Paris, 1825.), PINEL, jun. (*Rév. Méd.* t. vi.), FOVILLE, and PINEL-GRANDCHAMP, furnish numerous instances of it, thus related: and, from the history of the cases, as well as the generally augmented vascularity of the membranes and of the indurated brain itself, I infer that it is a consequence of chronic inflammatory action, conjoined with some change in the nutrition of the cerebral substance; and that it proceeds from a less intense and more chronic state of the vascular action than that which occasions softening, or pulpy destruction of the cerebral texture. That such is the case, is proved, not only by my own experience, but also by the observations of the authors enumerated above; for, in the majority of those cases, even when presenting the appearances and consequences of cephalo-meningeal congestion and inflammation, the symptoms of cerebral disease were of much longer duration, than those depending upon morbid softening of the organ.

107. It has already been stated, that induration of the cerebral substances, amounting to either the second or the third degree, is generally circumscribed in extent. Whatever doubts may be entertained of the first degree of hardening being the result of chronic rather than of acute disease, there can be no doubt of the second and third being always a chronic affection—perhaps, of a still more chronic state of capillary action than that giving rise to the first form of increased hardness; the morbid action, affecting in the former cases a portion of the brain only, may be compatible with a longer duration of life, and hence give rise to ulterior or more advanced stages of change than those presented when the whole organ is affected, and all its functions and energies thereby involved. That this change is one of the consequences of chronic irritation, or inflammatory action, may be conceded, as well as the supposition entertained by ANDRAL and CRAIGIE, that the morbid irritation is connected with a perversion of the nutritive action. Indeed, the numerous cases detailed by PORTAL, SERRÉS, LALLEMAND, BOUILLAUD, PINEL, and others, furnish satisfactory evidence, both in the symptoms during life, and in the co-existent lesions in the membranes and other parts of the brain, of the existence of a chronic inflammatory action, or of a state of irritative erythism of its capillaries. But to say that this state is in such cases accompanied by a perversion of its nutritive actions, is ascribing to it what always is an attendant upon inflammatory action, of whatever grade, or in whatever texture it may be seated. It should, however, be mentioned, that M. LALLEMAND considers partial induration to occur occasionally as a favourable termination of morbid softening of the brain; but this is a mere supposition.

108. As to the phenomena to which induration of the brain gives rise, every practical man must feel considerable interest. The first and more general induration of the brain generally occasions loss of memory, confusion of thought, and derangement of the mental manifestations—causing insanity without lucid intervals. When the induration is advanced in degree, or considerable as to its extent, or both, and especially when its long duration has been indicated by continued

mental derangement, a complete obliteration of the mental faculties, or fatuity, is frequently its attendant towards the last periods of life, and may therefore be considered as the consequence of the most advanced degrees of this lesion. The signs of partial induration of the brain, in any of the grades to which I have referred, will vary according to the extent and seat of the lesion. They consist chiefly of a progressive defect of memory, inattention, or an inability to pursue a long train of ideas, indifference to momentary impressions, and to present or future occurrences, difficulty of articulation, derangement of ideas, with partial or total loss of the affections, appetites, and desires; and ultimately increased loss of speech, palsy, convulsions, or want of power over the muscles, fatuity, general or partial wasting, and death.

109. LALLEMAND found, in a patient who had complained of fixed pain of the forehead, palsy of the face, and confusion of memory; the membranes firmly matted together, for the extent of a thirty sous piece, at the anterior extremity of the left hemisphere; the subjacent cerebral substance hardened to a scirrhous or cartilaginous firmness, and adhering closely to the membranes. BOUILLAUD states, that of a man, aged sixty-eight, who, after symptoms of cerebral disease, had impaired memory, headach, difficulty of expressing his ideas, followed by muscular weakness and convulsions. The cerebral substance was found injected, and induration was seen “passing from the striated body of the left hemisphere, through the nucleus, at the upper region of which it formed a cavity with hard yellow walls; a similar hardened portion also existed in the posterior lobe. According to M. PINEL, induration confined to the brain causes fatuity, with more or less of palsy; but, if it extend to the annular protuberance, the crura cerebri, the corpora olivaria, or chord itself, epilepsy, followed by palsy, and death by marasmus, are generally superadded. In these advanced degrees of hardening, which are sometimes attended with a shrunk, depressed, and condensed appearance,—a species of atrophic hardening of the part,—there are usually remarked palsy and idiocy, which are either congenital, or occurring subsequently to birth.

110. vi. MORBID GROWTHS.—*Tumours of the brain.* Tumours of various kinds have been found to originate in the substance of the brain; but as Dr. CRAIGIE (*Anat.* p. 447.) has observed, they have not been distinguished with sufficient precision by authors, from those which, originating in the membranes, affect the brain only secondarily. The first form of tumour which he has described, and denominated “cerebral tumour,” entirely agrees with those partial indurations already considered; differing from them in no respect, but in the extreme degree of firmness it presents, which is similar to the second and third (the latter particularly) degrees of hardening, arising in the manner I have endeavoured to explain (§ 104.), and affecting all parts of the nervous masses,—the cerebellum and medullary chord, as well as the various parts of the brain itself. (See HARDENING, &c.)

111. A. *Tubercular secretion.*—*Tyroma* (CRAIGIE).—Tubercles of the brain have been described in recent times with much accuracy by GRINDRIN, LÉVEILLÉ, OLLIVIER, ABERCROMBIE,

ANDRAL, and CRAIGIE. They are formed of a white, or pale yellow, opaque, firm, cheese-like, sometimes granular and friable substance, consisting of a large proportion of albuminous matter, and varying in size, from that of a millet seed to the bulk of a hen's egg. This substance is deposited in various forms in the brain, but usually as follows:—1st, One, two, or more, homogeneous, distinct masses, of considerable size; 2d, Several, or many, separate, minute, spherical, or spheroidal masses. Cases of the first form of tubercular formations are to be found in the writings of MANGET, ROCHOUX (*Récherches sur l'Apoplexie*, p. 151.), POWELL (*Trans. of Coll. of Phys.* vol. v. p. 222.), BLANE (*Trans. of a Society*, &c. vol. ii.), BAILLIE (*Fasc. of Eng.* No. 10. plate vii.), COINDET (*Mém. sur l'Hydrocéph.* p. 106.), BOUILLAUD (*Traité*, &c. p. 161.), ABERCROMBIE, (*Dis. of the Brain*, &c. p. 428.); CHAMBERS (*Med. and Phys. Journ.* vol. iv. 1826, p. 5.), PIEDAGNEL (*Journ. de Phys.* t. iii. p. 247.), BERNARD (*Ibid.* t. v. p. 17.), and HOOPER (*Morbid Anat. of the Brain*, p. xi. and xii. fig. 1.). Tubercles of this class vary in number from one to five or six, and in size from that of a pea to the bulk of a hen's egg. In form they closely resemble tubercles in other parts of the body. According to LÉVEILLÉ, they are often of an unequal surface, so as to appear lobulated, particularly when they are very large. If only one or two are present, their size is generally considerable. M. ANDRAL mentions their existence in the cerebellum, of so large a volume as to destroy nearly the whole of one of its hemispheres. Even when of this bulk, they consist of the opaque, cheese-like substance already described, and are always destitute of vessels, or any trace of organic structure. They are albuminous, friable, and generally surrounded by a cyst. MM. GENDRIN and LÉVEILLÉ are of opinion that they always have cysts, but of variable thickness, which are sometimes remarkably thin, at other times, especially in old tubercles, thick and fibrous. The cyst adheres externally to the surrounding cerebral structure; and its internal surface sends off delicate filaments, which traverse the continued tubercular matter, and, in the large and old tubercles with thick cysts, seem like small fibres or partitions passing between the lobules of the contained substance, which is disposed in cells formed by these filaments. In some large and old tubercles, the cyst is fibrous, cartilaginous, or even osseous (GENDRIN), and is sometimes partially separated from the surrounding cerebral structure by a minute quantity of serous fluid. In proportion as the tubercle softens, the cyst becomes more apparent.

112. The surrounding cerebral substance is often perfectly natural, and some times variously altered;—occasionally inflamed, or softened, or atrophied, or even destroyed, especially when the tubercles are very large. Upon these lesions, the symptoms during life are often chiefly dependent. Very frequently, especially in children, tubercles varying as to number and size may exist in the brain, without occasioning any symptoms sufficient to lead to the suspicion of cerebral disease: but this seems to be the case only when the nervous substance around them has been but little changed from the healthy state. When nervous symptoms have appeared without such

change, they have generally assumed an intermittent character.

113. It is very probable, that tubercles are formed in the brain, as elsewhere, at first in a fluid state; and that they afterwards either undergo a slow coagulation, or have their aqueous portions partly absorbed, the albuminous and other more solid constituents forming the tubercular substance. M. BOUILLAUD believes that they are the product of an inflammatory process; and the tendency of inflammation to produce an albuminous secretion certainly countenances this opinion. Whatever may be the origin, they appear to experience in the brain a similar softening to that which they undergo when formed in other organs. When this is advanced to more or less partial fluidity, tubercles may be mistaken for other formations; and when amounting to liquefaction, the tubercular production can, with difficulty, be distinguished from a small encysted abscess. (See art. TUBERCLES.)

114. The second form in which tubercular productions are found in the brain, is that of spheroidal bodies, disseminated through its substance. Professor RILL (*Memorab. Clinica*, t. ii. fas. iii. No. 2. p. 39.) describes them, in a case which occurred to him, to have consisted of about two hundred spheroidal bodies lodged in the grey matter of the brain and cerebellum. They were a little firmer than the brain itself, mostly of a pale yellow, some of a pale blue, of the size of a lentil or pea, and consisting of an adipose-like substance. From some, which were marked in the centre with a dark point, and seemed covered by a thin cyst, a slight incision discharged a matter like vermicelli. These bodies were confined entirely to the cortical substance of the brain, chiefly near the deep anfractuosités, and but very few were in the prominent parts of the convolutions. They were most numerous in the superior aspect of the hemispheres, less so in the cerebellum, and least numerous in the base of the cerebrum. The pia mater was remarkably injected with blood, and the ventricles contained very much fluid. This patient had never complained of pain in his head, although long afflicted with scrofulous sores, until eight days previous to death. In a case recorded by M. CHOMEL (*Nouv. Journ. de Méd.* t. i. p. 191.), similar bodies were found disseminated through the brain of a woman aged thirty, who died with symptoms of cerebral disease. Two such productions were also found in the cerebellum, and one in the spinal chord. Cases similar to the above have likewise been recorded by other writers. Tubercles, even in the form now being considered, are seldom or ever found in greater number than in the case just quoted from RILL; and, as GENDRIN has remarked, they are never found in the brain in so very great numbers as in the lungs; nor, in my opinion, do they assume, in the cerebral structure, the agglomerated form, in which they are so often met with in other viscera, and in the lungs especially.

115. Tubercles are often met with in the brains of children, and those especially of a strumous diathesis, and upwards of one or two years of age. They occur most frequently from this age to puberty; after which they are rarely met with, even in scrofulous and phthisical subjects, where tubercles exist not only in the lungs, but

also in other organs. They are most common in the hemispheres of the brain, and there occupy indifferently either the cortical or the medullary texture: sometimes they appear, as it were, placed between both. In some cases in which they have been found in the more exterior layer of the cineritious structure, they seem not to have been originally formed in it, but to have sprung from the internal surface of the pia mater, and to have pressed inwards the cerebral tissue as they increased in size, forming, as it were, a superficial cavity in it, without any intimate union with it beyond that of close contact. The parts of the brain, after the hemispheres, where tubercles are most commonly found, are, according to M. ANDRAL, the cerebellum, the mesocephalon, the medulla oblongata, various parts of the spinal chord, the peduncles of the cerebrum and cerebellum, the thalami optici, corpora striata, the commissures of the thalami, and pituitary body. According to the order of frequency here indicated, it will be observed, that those parts of the cerebro-spinal axis which are most frequently the seats of inflammation, softening, or hæmorrhage, are not those which are oftenest the seat of tubercles.

116. *B. Adipose tumour* (WENZEL).—*Fatty productions* (ANDRAL).—*Lardaceous degeneration* (HEBBFART, *Annuaire Méd. Chirurg. Paris*, 1829. p. 579.).—*Ceroma* (CRAIGIE).—This morbid formation has been noticed, under the above designations, by the authors whose names are respectively noticed, and also by RUDOLPHI, BRAUN, CHUVEILLIER, MERAT, LEPRÉSTRE (*Archives Génér. de Méd.* t. xviii. p. 19.), and DALMAS (*Journ. Hebdom. de Méd.* t. i. p. 332.). BORELLI states that he has found, behind the upper part of the medulla oblongata, a fatty, homogeneous, reddish, or rose-coloured substance, the size of a nut, apparently traversed by reddish lines, and contained within a thin envelope. A similar tumour, though smaller, was found in the left cerebellic hemisphere. Amongst the great number of brains examined by the WENZELS, only two presented this change; which they describe as having been smooth, of a yellow colour, and consisting of a solid, adipose, ash-coloured substance; and, although found near the exterior surface of the hemisphere, penetrating deep into the substance of the organ.

117. According to M. HEBBFART, this disease is not so rare as the WENZELS lead us to suppose. He had met with four cases of it; two in which the tumour was seated in the brain, and two in the cerebellum. "In the first of the former, a distinct tumour, consisting of matter of a yellow colour, and lard-like consistence, the size of a nut, in the anterior part of the anterior lobe of the right hemisphere, gave rise to idiotcy. In the second, a square inch of the posterior lobe of the left hemisphere was converted into a yellowish pulpy matter, which was separated from the contiguous sound brain by hardened cerebral substance. This, in a man aged forty, caused epileptic paroxysms, occurring once or twice a month, which at last proved fatal, by causing asphyxia. In the first of the cerebellic cases, in a young man who had been idiotic for six years, the cerebral substance, forming the walls of the fourth ventricle, had been converted into a yellowish lardaceous matter. In the second, that of an

incurable maniac, a space, six lines in diameter, of the lower part of the right hemisphere of the cerebellum, had become hard, yellowish, and lardaceous, both in the grey substance, and also in the white." The membranes also participated in this change. M. HEBBFART considers that this lesion may occur in two forms.—1st, As a degeneration of the cerebral structure into a matter of a yellowish colour and lardaceous consistence; and, 2d, In the shape of a distinct tumour situated in the cerebral substance.

118. Closely allied to the above, although materially different in some respects, yet still more strictly deserving the term adipose, are the tumours described by LEPRÉSTRE and DALMAS. M. LEPRÉSTRE found, in the left side of the mesocephalon of an adult subject, a large tumour, with a brilliant lobulated surface, consisting of concentric layers, united by means of fine cellular tissue, but without any trace of blood-vessels. It was denser in its structure than the brain, and closely resembled a mass of adipocire. This resemblance is remarkable, inasmuch as MM. BARRUEL and GMELIN have demonstrated, in the healthy human brain, a certain quantity of fatty matter and cholesterine. The tumour found by M. DALMAS nearly resembled the foregoing. It was situated in the base of the brain, and was as large as a hen's egg. It rose upwards into the third ventricle, separated the parts which contribute to the formation of this cavity, and disappeared in the medullary substance of the striated bodies, the thalami optici, the anterior commissure, &c. Its superior surface closely resembled spermaceti. Its inferior surface was transparent, polished, and studded with a number of pearlike granulations, from a line to a line and a half in diameter, which were, like the whole of the mass, perfectly homogeneous, and devoid of every trace of organisation. When analysed by M. BARRUEL, this tumour was found to contain a very large portion of fatty matter, and a substance which seemed to be cholesterine. The description of a similar tumour is recorded in the first volume of the *Journal Clinique des Hôpitaux*. OTTO also found a fatty tumour, which contained hair, protruding through an aperture in the hemisphere into the ventricle, its cyst shining like mother-of-pearl.

119. *C. Flesh-like tumour*.—*Adenoidea* (CRAIGIE).—This production has been described by the vague names of scirrhus and scrofulous tumour; but it cannot be admitted to possess unequivocal characters of either. It is generally stated to be similar to a mass of flesh, or an enlarged absorbent gland. Its colour is light pink, or pale flesh-colour; its firmness is considerable; and, in some instances, it is compared to the kidney. Cases of this description of lesion may be found in the writings of PLATER (*Obser.* l. i. p. 13.), T. BONET (*Sepulchretum*, t. i. p. 283.), RHODIUS (*Cent. Obs.* l. No. 55.), J. J. WAGNER (*Miscell. Curios. Dec. II. Ann.* 10.), J. G. ZINN (*Comment. Soc. Reg. Scient. Gott.* t. ii. 1752.), J. J. HUBER (*Nova Acta Physico-Medico Acad. Cæs. Leop. Cur.* t. iii. p. 533.; et *Comment. de Robus in Scient. Nat.* t. xviii. p. 335.), HALLER (*Opusc. Path. Obs.* i.), J. F. GREDDING (*Ludwig's Advers. Med. Prac.* t. ii. partii. p. 492.), H. EARLE (*Med. Chirurg. Trans.* vol. iii. p. 59.), POWELL (*Trans. of Coll. of Phys.* vol. v. p. 241.), &c. Most

of those cases appear to have occurred in strumous habits; and, besides signs of glandular disease, many of them were affected with palsy, apoplexy, or mental derangement; and others with convulsions and epilepsy, shortly before death. M. ANDRAL (*Anat. Patholog.* t. ii. p. 848.) mentions his having found, in the middle of one of the hemispheres of the brain of a person who had died of apoplexy, a fleshy fibrous tumour of the size of a walnut.

120. *D. Fibro-cartilaginous tumour.*—*Scirrhus, Chondroma* (HOOPER and CRAIGIE),—is probably, in its slighter grades of change, merely an advanced state of the third variety of partial induration of the brain (§ 103.). It is distinguished from the surrounding cerebral substance by its great firmness; its irregular and lobulated form; its yellowish, hard, and fibrous structure; and, in its advanced stages, by the presence of a semi-fluid, gelatinous matter, occasionally tinged with blood, contained in small cavities, disseminated through it; and by a tendency to softening; death, however, generally taking place before complete softening, or cancerous ulceration, has supervened. This tumour is not often met with in the substance of the brain, and very seldom as a primary affection. It seems to consist of a change in the structure of the part affected, rather than of a deposition of adventitious matter; and it is not enveloped by any cyst; but gradually disappears in the surrounding substance, which is sometimes softened. All the cases which have been recorded of scirrhus of the brain, are not in every respect similar to the above description, but an approximation to it merely; some, according to the loose accounts given of them, being intermediate between this and the cartilaginous conditions. The best illustrations of this form of tumour have been furnished by CROUVILLIER (*Anat. Pathol.* t. ii. p. 80.), ROSTAN (*Récherches sur le Ramollissement du Cerveau*, &c. 1re ed. p. 80.), ANDRAL (*Journ. de Physiol.* t. ii. p. 105.), BOUILLAUD (*Traité Clinique de l'Encéphalite*, &c. 1825.), LERMINIER (*Ann. Méd.-Chirurg.* 1819. p. 225.), MONRO (*Morb. Anat. of the Brain*, p. 55.), WADE (*Medic. and Phys. Journ.* vol. iv. p. 369.), BAYLE (*Réch. sur la Phthisie Pulmon.* &c. p. 305.), and COPLAND HUTCHISON (*Trans. of Méd. and Chir. Soc.* vol. ii. and iv.). All these cases were characterised by acute pain in the head, stupor, palsy, idiotcy, convulsive movements, and, at last, insensibility, coma, or complete apoplexy, and death; or by one or more of these symptoms; and several of them seemed to originate in external injury received at a more or less remote period.

121. *E. Bony tumours and calcareous concretions.*—*Osteoma* (HOOPER),—are rarely observed in the substance of the brain. Cases have, however, been furnished of their formation, in more or less considerable masses,—near the right ventricle, in an idiot, by KERKINGIUS (*Obs. Anat.* p. 135.); in the corpus striatum, by DEJERIE (*Des Tumeurs*, &c. p. 351.), and KENTZINN (*De Calc. in Hominib.* Tig. 1536.); in one of the corpora quadrigemina, by TAYSON (*Phil. Trans.* No. 228.); in the union of the optic nerves, by BLENNY (*Zodiac. Gall. Obs.* xiv. p. 81.); where they were attended by violent pain in the occiput, by BOYER (*Crouvillier's Anat. Path.* t. ii. p. 84.); in the cerebellum, by LITTE (Mémoires de l'Académie de Paris, 1705. p. 55.); in the cerebellum of an epileptic,

by LIEUTAUD (*Hist. Anat. Méd.* l. iii. Obs. 179.); in the pons varolii, by METZGER (*Obs. Anat. Reg.* 1792. p. 3.); in the optic beds, by CALDANI (*Opusc. Anat. Path.* 1803. p. 51.); in one hemisphere of an epileptic, by OTTO (*Comp. Anat. Path.* p. 415.); in the cerebellar peduncles and protuberance of an idiot, by HOME (*Phil. Trans.* 1814.); in the left hemisphere, by ANDRAL (*Journ. de Physiol.* t. ii. p. 110.); in the cerebellum, with violent pain at a determinate part of the occiput, by NASSE (*Abercrombie on Dis. of the Brain*, p. 426.); in the centre of the medullary substance of the anterior lobe, with pulpy destruction of the surrounding part in one case, and in the cerebellum in another, by Dr. HOOPER (*Morb. Anat. of the Brain*, p. 39.). Besides these, other instances are referred to in the *Repertorium* of PLOUQUEUR, and the *Compendium* of OTTO. In more numerous cases, the chalky, calcareous, or bony matter, is disseminated like sand in a diseased portion of brain, and can be detected only by squeezing or rubbing the part between the fingers. In some cases, the bony matter appears like minute spicules, or particles; and Dr. HOOPER states that he has found each of them attached to a filamentous vessel.

122. *Sabulous concretions* are so constantly found in the *pineal gland*, or its peduncles, even of those whose cerebral functions were most healthy, that SOEMMERING conceived them to form a part of its natural structure in adults. But this part may be greatly enlarged, and contain calcareous matter to an excessive amount. A case of this description is given by MANGET (*Theat. Anat.* l. iv. c. ii. p. 309.) and SALZMANN (*De Gland. Pineal. Lapid.* Arg. 1733.).

123. *F. Hygromatous tumours, or cysts, containing a serous or albuminous fluid.*—*Hygroma* of HOOPER),—are not infrequently found in some part or other of the brain. Dr. HOOPER has described four varieties of these cysts:—*a.* That consisting of a *simple cell*, or cavity, containing a transparent, yellowish, or yellowish red, serous fluid. Their sides are somewhat harder than healthy brain, occasionally rough, and of a brownish hue internally, but mostly smooth and shining. They present no appearance of membrane lining the cell, nor of vascularity; are of the size of peas or nuts, and are most frequently met with near the external surface of the brain. They appear to be the remains of cavities formed by extravasated blood. *b.* Another variety is a distinctly *encysted tumour*, consisting of a membranous cyst, or vesicle, filled with a serous fluid. This cyst is delicate, is formed of a single membrane, and is provided with vessels coming from the surrounding brain, and which may sometimes be seen ramified over it. The fluid which fills it is colourless and limpid. This variety varies from a very small size to that of a small orange. It is sometimes solitary; but occasionally two or more may be embedded close together. *c.* Dr. HOOPER describes *two other varieties*, one of which is formed of a cyst, which is opaque in some parts, and transparent in others, and distended with a sero-albuminous fluid. The cyst is not apparently vascular, but is much thicker than the preceding; and its contents coagulate by heat: *d.* The other is characterised by the remarkable thickness of its cyst, and the thick albuminous nature of its contents. It is generally found

embedded in the medullary substance of the brain.

124. *G. Hydatids*. — The existence of *true hydatids*, — both the *acrophocyst*, or headless hydatid, and the *cysticercus*, or bladder-tailed hydatid, — in the substance of the brain, has been doubted. Several cases of hydatids in this part have been adduced by authors; and instances have occurred to ANDRAL and CALMEIL (*Anat. Pathol.* t. ii. p. 779.), which they considered to belong to the latter of the above species of entozoa; but whether they actually were such, or some one of the cysts described above, rests upon the pathological reputation of these physicians. Those adduced by HOME, HEADINGTON, MORRAU, and ROSTAN, seem to have been merely varieties of *hygroma*. Dr. HOOPER never met with hydatids in this situation, in his numerous dissections. BRENA states that he has found them in the choroid plexus; and Dr. MONRO relates a case, where a cyst, which he considered as a true hydatid, was found in one of the ventricles. But their connection with the membranes of the brain (§ 31.) has already been shown.

125. *H. The Hematomatous tumour*, — the *Hæmatoma* of HOOPER, — is not common. It is mostly fungous, arising from a small base, separating the convolutions and cerebral substance about it, as it enlarges and rises towards the surface of the brain. It is soft to the touch; is elastic, and covered with a vascular and shaggy membranous tissue. When divided, its inner structure is vascular, mottled, of a whitish brown, and, in some parts, of a bloody colour; and a humid substance adheres to the knife like cream. Interesting cases have been detailed by ROCNOUX (*Réch. sur l'Apoplexie*, Ob. 38. p. 149.), HOOPER (*Op. Cit.* pl. x.), MONRO (*Op. Cit.* p. 56.), and G. GREGORY (*Med. and Phys. Journ.* vol. liv. p. 462.), in which these tumours were, exteriorly, of a reddish or reddish brown colour, lobulated, and surrounded by pulpy destruction of the cerebral substance. In two of the patients, violent head-ach and epilepsy, and, in one, palsy, followed by coma, preceded dissolution. This tumour must not be confounded with the solid nodules of extravasated blood, often found after apoplectic seizures.

126. *I. Encephaloid or cerebriform tumours*, — *Medullary sarcom*, — *Fungus hæmatoides*, — *Cephaloma*, HOOPER. — These tumours are not frequent. Delineations of them have been given in Dr. BAILLIE's and Dr. HOOPER's illustrations. They occur chiefly in young subjects; and are encysted, soft, compressible, and spongy, resembling the grey cerebral substance, with a tinge of red, and of the consistence of the foetal brain. They are frequently divided into lobulated masses. When cut with a knife, the surface is smooth, and the knife is covered with an unctuous substance. I have met with one case in a boy of eleven years of age. M. BAYLE found it in the cerebellum of a middle-aged man. (*Rev. Méd. Avr. 1824, p. 77.*)

127. *K. The Melanoid tumour*, — *Melanosis*, — *Melanoma*, of HOOPER. — *Melanosis* has rarely been found in the brain. Dr. HOOPER has, however, observed it in a tuberculous form, both in the cineritious and medullary structure. These tumours were of a jet black colour, soft, distinctly circumscribed, and closely surrounded by healthy brain. Dr. H. has found them of all sizes,

from that of a mustard seed to that of a walnut. "They are so soft as to require a very sharp knife to cut them, which they soil. They are easily taken out of the brain with a forceps, and leave a clean cavity, without any cyst apparent to the naked eye; and if shaken in water, they colour it black, and a flocculent substance remains. In one instance, in which there were several of these tumours, some of them were of a blood or liver colour, and resembled hæmatoma (§ 125.); others were perfectly melanomatous; and several were of an intermediate colour, — a circumstance which is very much in favour of the hæmatoma and melanoma having an intimate connection, if they be not one and the same disease, modified by particular circumstances." (p. 41.)

128. All the tumours now described occasion alterations, generally of an inflammatory nature, with softening in the substance of the brain contiguous to them; and until these alterations have been in some measure produced, they often give rise to but little disturbance of the functions of the organ. However, when these changes become developed, the usual symptoms of *circumscribed inflammation of the substance of the brain*, with softening; *epilepsy*; *loss*, or *perversion* of one or more of the mental faculties — amounting often to *insanity*; *idiocy*; *palsy*; *coma*, and *apoplexy*; are the usual effects. (See the *Articles on these diseases*.)

129. vii. RUPTURE OF THE BRAIN. — *Hernia cerebri*, — *Encephalocete*, — is occasionally met with. It consists of the protrusion externally of a portion of the brain through openings in the cranial bones. This lesion either may be *congenital*, or may arise *subsequently* to birth. In the former case it is generally connected with effusion of fluid in the ventricles. The protrusion of brain varies with the size of the aperture in the skull, and the quantity of effusion causing it. In some cases a large portion of the skull is wanting, and the protruding part of the brain has a wide base; in other cases, the opening in the cranium is small, and the protrusion is either very small, or attached to a narrow neck. OTTO states, that in every case which he has observed, the lesion was owing to effusion, and not to hypertrophy of the substance of the brain; and that the aperture arising from deficient development of the bones of the cranium was one of the consequences of the effusion. This agrees with my experience, and constitutes *hydrencephalocete* or watery rupture of the brain. In some cases large portions of the brain are protruded, in others but small. Frequently the protrusion consists only of the membranes forming *hydrencephalocete meningeæ*, and the water which they contain. OTTO describes this as a rare occurrence. I have met with several cases at the Infirmary for Children, and in unusual situations, namely, through clefts in the parietal bones. In rare cases of *hernia cerebri*, the water is found both within the ventricles and between the membranes.

130. Congenital rupture of the brain occurs most frequently on the back of the head, through the enlarged occipital foramen, and the cleft upper cervical vertebra, or through a cleft in the upper part of the occipital bone, or in the lambdoidal suture. It is not frequent at the top of the head, especially at the great fontanel; and OTTO says it is still more rare in the sides of the skull and

forehead, and the rarest of all in the orbits and sphenoidal sinuses. Two cases, however, of its occurrence at the sides of the skull have come before me. Rupture of the brain, occurring *after birth*, arises from the expansion of the brain by its own elasticity, or by increased determinations of blood, and its consequent detrusion through apertures naturally or artificially made in the cranium. I have met with cases, however, in which no protrusion of the brain had been observed after birth; and yet apertures, through which it might have occurred, were found in the middle or squamous parts of the bones, and must have been congenital. The inference is, in these cases, that a watery tumour of the brain had arrested the formation of the bone immediately over it, and that this tumour had subsequently disappeared, probably from the absorption of the aqueous effusion; but that the bone had not yet been formed in the situation where the ossific process had been interrupted.

131. viii. LACERATION.—The continuity of the brain may be destroyed by external violence, or injuries penetrating the cranium, either with or without loss of substance. Concussions also will lacerate the brain, without the skull being penetrated or even fractured. The substance of the organ, particularly the septum and fornix, may be torn by large collections of water in the ventricles. There is every reason to suppose that, when the solution of continuity is simple, adhesions will take place. When there is less of substance, the injury can be repaired only by granulation. If the laceration be accompanied with the effusion of blood, so as to form a large coagulum, requiring to be absorbed, the reunion of the opposite sides of the lacerated brain is effected by means of a fine cellular tissue; permanent paralysis being the usual consequence. When the granulations of the lacerated brain protrude through the fractured skull, owing to their luxuriance, or rather to the elasticity of the brain; and when the protrusion proceeds from the distension arising from the fulness of its vessels, the morbid condition has been improperly called *fungus cerebri*,—improperly, inasmuch as the term *fungus* is applied to a malignant and constitutional malady.

132. ix. ECCHYMOSES, AND ALTERATIONS OF COLOUR.—Besides the lesions now described, there are others of a less remarkable kind, of which a brief notice may be taken. *a.* The cineritious substance may be extremely pale, and even approximating to white; and it may also be of a very deep colour, and almost approaching to black, particularly in some cases of asphyxia and fevers, owing probably to the dark and imperfectly decarbonised state of the blood. The different layers composing this substance are sometimes also more than usually distinct, and separate easily from each other (M. FOVILLE and Dr. BRIGHT). In other cases they are very thin, as if in a great measure absorbed. This part of the cerebral substance likewise, in some instances, presents numerous ecchymosed spots of various sizes and depth of colour. *b.* The medullary structure is also sometimes ecchymosed, particularly after concussion; and variously mottled, and presenting blotches of a pink, purplish, greyish, or of a greyish yellow. These changes seem to proceed from excessive injection of the minute capillaries of the organs, and probably from par-

tial extravasation of their contents, owing to over-distension, or a morbid state of the blood which had circulated in them shortly before death, and are most commonly observed after death from convulsions and malignant diseases.

133. As respects the colour of the brain generally, I may state that it is sometimes found unusually pale from deficiency of blood, in cases of anæmia and cachexia. But it is more commonly of a deep or pink colour, particularly in those who have died from apoplexy, strangulation, narcotic poisons, asphyxia; and in the insane, or those given to drunkenness. In some cases resulting from those diseases, or attended with cerebral congestion, dark red, bluish, or purple coloured spots, or even streaks, have been found in both the cortical and medullary structure. In cases of inflammatory irritation, a reddish or pink hue is observed. A red colour is rarely met with, but more commonly a pale rose tint, unless effusion of blood have occurred. I may also state, at this place, that if, in severe diseases of the brain, the blood be decomposed, or if the colouring particles be secreted in various proportions, the brain will present different shades of colour, both in its cineritious and in its medullary substance: it will thus be either a pale or dusky yellow, an orange, a brown, greyish green, a slate colour, and even here and there soot-coloured. Occasionally, also, in different changes of texture, although even without these, a deposition of a melanotic pigment takes place, chiefly in the course of the larger vessels, independently of the melanoid tumour (§ 127.). OTTO never observed the brain generally tinged yellow in cases of jaundice, and doubts it having ever occurred, although STOLL says that he has seen it. I should add, that the above changes of colour are independent of marked softening or pulpy destruction of the cerebral substance.

BRAIN.—ANÆMIA OF THE.—See § 132., and art. CONVULSIONS.

BRAIN.—CEREBRAL PLETHORA.—Determination of Blood to the Head. CLASSIF. II. CLASS. I. ORDER (Author).

134. When the blood is determined in too great quantity to the brain, although the patient may not be altogether incapable of his usual avocations, yet much disorder may be present, which, if neglected, may lead to serious diseases, more especially to those which will be considered in the sequel of this article.

135. Causes.—The causes of general vascular plethora likewise occasion this affection. Those which are more peculiar to it, are inactivity of the secreting and excreting functions, mental exertion, retention of accustomed evacuations and discharges, full living, sedentary occupations, and want of exercise in the open air; organic diseases of the heart, particularly hypertrophy of the left ventricle, and those causes which are enumerated under the article APOPLEXY.

136. Symptoms.—Cerebral plethora, and determination of blood to the head, differ in many respects from cerebral congestion, or *coup de sang* (§ 139.), but the symptoms accompanying them vary chiefly in degree. Where the disorder consists merely of plethora from local determination, somnolency, cephalalgia attended with scintillations, and objects appearing of a red colour, vertigo, noises in the ears, sometimes sleeplessness, moral and

physical excitation, intellectual activity; or, on the contrary, inactivity, inability of continued attention, stiffness, cramps, twitchings, &c. of the limbs; animation of the countenance and eyes, which are sometimes red or injected, with strong pulsation of the carotid and temporal arteries, full and somewhat frequent pulse, and slightly increased temperature about the head, are the usual symptoms.

137. *Morbid appearances.*—This state of disorder never of itself occasions death; but, as it sometimes occurs in the advanced stages of fatal diseases, it has been observed to consist of increased vascularity in the brain and its membranes, without further organic change; but it is sometimes accompanied with a slight serous effusion into the ventricles and between the membranes, particularly towards the base of the brain. This effusion seldom amounts to more than may be present in the healthy state of the organ, the excess being probably rather a consequence of death, than its antecedent.

138. *Treatment.*—Cerebral plethora may generally be removed by avoiding the causes inducing it; by promoting the abdominal secretions and excretions by the usual means; by the affusion of cold water on the head, and the daily use of the shower-bath, or by sponging the head with cold lotions; by clothing the lower extremities warmly, and promoting the cutaneous perspiration; by regular daily exercise; by due attention to the quantity and quality of the food; and by changes of air in obstinate cases, and sea voyages.

BRAIN. — CONGESTION OF BLOOD IN THE. —
Coup de Sang. — *Cerebral Congestion.* CLASS.
SIF. II. CLASS. I. ORDER (*Author*).

139. Congestion is an advanced as well as a modified state of cerebral plethora, and consists in too great an accumulation of blood in the vessels of the head, particularly in the venous capillaries and sinuses, occasioned either by too great a flux of this fluid to the brain, an exhausted tone of the capillaries and smaller vessels, or impeded return of it by the veins. This state of circulation in so important an organ as this is, necessarily occasions marked lesion, not only of the functions which it performs, but also of other functions throughout the system.

140. *Symptoms.*—Cerebral congestion is characterised by numbness, vertigo, noises in the ears, somnolency, brilliancy or watering of the eyes, cephalalgia, redness of the countenance, beating of the carotids and temporal arteries, loss of recollection, &c. These symptoms continue for some time in different degrees, sometimes disappearing, and after a while returning, accompanied with cramps, twitchings of the limbs, generally of both sides: at last the patient loses sense and voluntary motion, in a more or less sudden manner. But usually in the course of a few minutes, or, at furthest, some hours, the more urgent of these symptoms disappear; leaving, however, numbness of the limbs, which generally disappears in a short time, or in the course of one or two days.

141. In the more severe cases, and those which more nearly approach complete apoplexy, the attack is preceded by disorder of the stomach, or accompanied by nausea, or vomitings; and sometimes, during the loss of sense and voluntary motion, the stools and urine are voided involun-

tarily; respiration is more or less embarrassed, but not stertorous; the pulse is strong, frequent, and full; the temporal and carotid arteries beat strongly; and the skin is generally warm and natural. Cerebral congestion is almost always general throughout the brain, but it is also, although rarely, local, affecting only one hemisphere; and, owing to the numbness and temporary paralysis thereby occasioned, is confined either to one limb or to one side of the body; simulating apoplexy, or paralysis from hæmorrhage in the brain. That these local symptoms are, however, owing to partial congestion, and not to hæmorrhage, is evinced by the celerity with which they disappear under judicious treatment. When the cerebral congestion is very great, it constitutes a form of *apoplexy*, noticed in the article on that disease, and may occasion death without any further lesion than congestion merely.

142. *Appearances on dissection.*—The scalp, and even the bones of the cranium, in some cases, are of a red violet colour, and allow of a considerable quantity of blood to escape upon being divided. The vessels, and particularly the sinuses, are filled with dark blood. When the arachnoid of the pia mater is separated from the brain, a reddish patch, more or less deep, is formed, the vessels running through it being gorged with blood. The surface of the convolutions are of a more or less dark colour; and, when the cortical substance of the brain is divided, it is of a deeper hue than natural, the orifices of the cut vessels giving out drops of blood proportionate to their size. Upon dividing the medullary structure, which is usually not so white as in health, myriads of minute specks, becoming small bloody drops, rapidly form on the surface. The large vessels, and particularly the veins of the brain, are gorged with blood. When a person cured of repeated attacks of cerebral congestion, dies of a different disease, morbid appearances are seldom detected in the brain.

143. *Terminations and complications.*—Cerebral congestion may occasion *meningitis*; or *inflammation* and *softening* of the substance of the brain; or *hæmorrhage* in some situation within the cranium, giving rise to complete *apoplexy*, or *palsy*, or both; and serous effusion in the ventricles, or between the membranes; many of the cases of *apoplexy*, attended with extravasation of blood, thus commencing in congestion, the extravasation being a consecutive change. It may also supervene on organic changes of the heart and lungs, and in the progress of various fevers, and thus be complicated with these diseases.

144. *Causes.*—The causes of this state of the cerebral circulation, are those which have been already detailed in the articles *Apoplexy* and *Cerebral Plethora* (§ 134.).

145. *Treatment.*—*Blood-letting*, general, local, or both, to an extent which the constitution, habit, and symptoms of the patient indicate, are requisite. Next to blood-letting, active purging by calomel, followed by a dose of senna, croton oil, or some other active cathartic, and promoted by strong cathartic injections, such as the oleum terebinthinæ, oleum ricini, extr. colocynth. comp., &c. are required, and should be repeated, so as to procure copious evacuations, and keep up sufficient action in the alimentary canal. The affusion of cold water on, or cold sponging the head,

is generally beneficial; and when the temperature is increased, and the countenance and conjunctiva flushed, a thick oilskin should be placed under the patient's head, which ought always to be kept elevated, and covered with cold epithems. Due attention should be constantly paid to the state of the evacuations. Accumulations of bile in the gall bladder or hepatic ducts, and of fecal matter and morbid secretions in the alimentary canal, frequently predispose to or induce an attack, which will seldom altogether yield to the means employed, unless these morbid collections are removed by appropriate means: and as long as the evacuations continue unhealthy, we may infer that the chief cause of disorder is not altogether removed. (See *Treatment of APOPLIXY*.)

BRAIN — INFLAMMATION OF THE. CLASSIF.

1. *Class*, Febrile Diseases; 2. *Order*, Inflammations (*Cullen*). 3. *Class*, Diseases of Sanguineous Function; 2. *Order*, Inflammation, (*Good*). III. CLASS, 1. ORDER (*Author*, see *Preface*).

146. NOSOL. DEFIN. — *Pain of the head more or less violent, with suffusion or prominence of the eyes; generally tumid or flushed countenance, delirium, or sopor, or both, or a marked predominance of either; with symptomatic fever; and frequently with lesion of the senses and functions of relation.*

PATHOL. DEFIN. — *Inflammation of either the membranes or the substance of the brain, or of both, generally with predominating lesion of either the one or the other.*

147. The recent researches of anatomists and pathologists have tended to advance our knowledge of the phenomena of inflammations of this important organ. The investigations of M. MACCENDIE, who has shown that its membranes exhale in health a limpid serum for the purposes of protecting the parts they surround, of facilitating the movements to which they may be subjected, and of accommodating and imparting a certain degree of superficial pressure, so that they may not suffer from the varying positions and states of vascular plethora to which they are obnoxious, have indirectly thrown considerable light on the pathology of the brain. Much, however, is still required to be known, not only as to the further relations which these membranes hold to the cerebral organs, in the performance of their healthy functions, but more particularly as respects the connection which subsists between their organic lesions and their symptomatic or functional disorders.

148. We know that the more internal and the most vascular of these membranes are chiefly appropriated to the distribution of the circulating fluid by means of the minute capillaries which it transmits to the external surface of the brain. We may thence infer that the functions, and even the organic conditions of the brain, in these situations especially, will be greatly modified, or even altogether changed, by the varying condition of the circulation in this membrane. When, therefore, it is the seat of inflammation, disease will be more or less extended to the substance of the brain; and will more or less influence the functions of this organ, particularly in the parts which it supplies with blood. The membranes, however, exterior to the pia mater, may be affected to a considerable extent without this

latter participating much in the disorder: and here our knowledge is both imperfect and deficient in precision: for we are not enabled to state that in such cases the functions of the brain itself are undisturbed, or, if disturbed, in what manner the lesion of these exterior membranes affects this organ; and, being imperfectly informed respecting all the offices of these membranes, we are less able to trace the relation between healthy function and the phenomena which inflammation of them present. Surrounded thus with difficulties, which the advances of science will doubtless diminish, are we therefore to leave the subject without investigation, or relinquish the attempt to place in order and explain those facts which we have already obtained, and which may be made subservient to a further elucidation of the subject?

149. In no other organ of the body is it so difficult as in the brain, to trace the relation between demonstrable change of structure and morbid manifestations of function. This is partly owing, no doubt, to the circumstance of its being a double or symmetrical organ; lesions seated only in one half or side of the brain, when unattended by absolute disorganisation, not occasioning a corresponding degree of disorder as long as the same part of the other side is unaffected. *Delirium* has been conceived to be a symptom indicating the existence of inflammation of the membranes of the brain; yet *delirium* is a disorder of those functions which we conceive to be performed by the cerebral substance itself; and every experienced practitioner must have observed, and numerous are the cases on record, in which inflammation to a great extent, and all its consequences — as thickening, adhesions, effusions of lymph, or even of purulent matter — have been observed, and yet there had been no *delirium*. It is, therefore, to be inferred, that, when *meningitis* is accompanied with *delirium*, the disease extends more or less to the pia mater or parts enclosed by it. This inference, however, might lead to a conclusion which seems not well founded, viz. that it is impossible to distinguish *meningitis* as a disease independent of inflammation of the substance of the brain. This, doubtless, is often difficult, because both diseases frequently co-exist in different degrees, or co-ordinately; yet still an extensive experience will show that they often exist separately: and hence the necessity of ascertaining what are the characters which are proper to each. In respect of diagnosis, the subject possesses interest; and although the treatment in both is, in its principal points, the same, yet on some occasions it requires to be modified.

BRAIN — INFLAMMATION OF ITS MEMBRANES.

SYN. *Meningitis, Paraphrenitis et Phrenitis,*

• Auct. Var. Recent. *Arachnitis*, Parent and Martinet. *Cephalitis Meningica*, Good. *Phrénésie*, Pirel. *Méningite*, Fr. *Die Hirnhautentzündung*, Ger. *Brain Fever*.

150. DEFIN. *Acute pain in the head, with intolerance of light and sound; watchfulness, delirium; flushed countenance, and redness of the conjunctiva, or a heavy suffused state of the eyes; quick pulse; frequently spasmodic twitchings or convulsions, passing into somnolency, coma, and complete relaxation of the limbs.*

151. We are rarely enabled to distinguish between inflammation of the arachnoid membrane and that of the pia mater by the symptoms during life, I shall therefore comprise under the head of *meningitis*, inflammations affecting one or more of the membranes of the brain.

152. SYMPTOMS. — As the uses of the cerebral membranes are not rendered sensible by manifest functions, it may be concluded that diseases of these parts may exist to a considerable extent, without any distinctive symptoms. The justness of this observation is but too frequently confirmed by experience; for there are few practitioners who have diligently employed their opportunities of *post mortem* research, and have not observed appearances of inflammation, without much disorder of the intellectual faculties, or of the movements of the body, having been manifested almost up to the moment of death. Such instances are not rare, particularly in persons advanced in life. More frequently, however, when the membranes are inflamed, the adjoining portions of the brain, the functions of which they are probably intended to facilitate, evince some sort of disorder, particularly of their usual functions. These symptoms, although indirect, are generally similar to those of the inflammation of the cerebral substance itself, and are the chief guides to lead us to the recognition of meningitis.

153. The symptoms vary according to the seat of the inflammation, the stage at which it has arrived, the severity of the attack, and the celerity of its progress. The disease in its usual form presents three periods: 1st, that of invasion; 2d, that of fully developed inflammation; and, 3d, that of compression. Some one of these periods, however, does not always exist, particularly when the inflammation is very general or very circumscribed, or when it is very acute or very chronic in its progress. Meningitis affects more frequently that part of the membranes which covers the convexity of the cerebral lobes, in adult subjects; and the portions about the base of the brain, in young children.

154. *A. Acute meningitis* of the convexity of the cerebral lobes is attended with violent pain, which is exasperated at intervals, and often with stupor or somnolency. It occupies various regions of the cranium, the frontal, occipital, sincipital, &c., and is augmented by motion, particularly by rotation of the head, which in children is often drawn backwards. In this class of patients the pain is expressed, particularly upon being roused, by a peculiar cry, which the experienced observer recognises as a diagnostic sign of the disease, and after uttering which the infant sinks into a somnolent stupor, in which it grinds its teeth frequently. The functional derangements occasioned by meningitis are usually of a general character, although the inflammation is more frequently of limited extent. This is owing to both sides being attacked at the same time; cases where the meninges are inflamed on one side only being very rare.

155. *a.* Pain in the head is generally preceded by chills or rigors, which may be viewed as the result and indication of the formation of the disease; but cases not infrequently occur, wherein the foregoing signs in a greater or less degree precede the rigors even for a considerable time. The face at first is often pale; but, as the

disease becomes fully developed it is more frequently slightly tumid, flushed, and expressive of pain, and the eye-brows knit or contracted; the eyes are heavy or brilliant, injected and watery, generally nearly shut, incapable of bearing the light, and the pupils contracted. The patient thinks he sees fire, or scintillations of light; and sometimes the colours of bodies appear differently shaded. The slightest noise is insupportable, and all the senses are in a state of morbid activity. His answers are brief and quick, and there is an evident activity of mind, but as yet no delirium. His disposition, however, seems changed; and he becomes impatient, irritable, abrupt, and quick in his manner, and his countenance is expressive of irritation and pain. The temperature of the head is now greatly increased; the pulse is frequent and developed; the tongue rather dry, its papillæ more or less erect and distinct; thirst is complained of; the urine is scanty and high-coloured, and the bowels are obstinately constipated; but in some instances, in children, either relaxed or irregular, and the evacuations morbid and offensive. From the commencement of the attack there is generally vomiting, particularly in children, which recurs at intervals, is unattended with tenderness or pain at the epigastrium, and is manifestly sympathetic of disease within the head. In adult subjects, vomiting is sometimes absent. It is not infrequently remarked, that this stage either does not occur or passes unobserved in aged persons. The patient loses suddenly his recollection, as in congestion only of the brain; but to this succeed febrile symptoms, distinguishing it from this latter affection.

156. *b.* After an indeterminate period, commonly varying from one to three or four days, according to the intensity of the attack, violent delirium comes on, but not constantly. If the pain in the head continues, it is not complained of by the delirious patient; and the senses are no longer intolerant of their natural excitants; the pupils commence to dilate or to contract, and strabismus supervenes; the countenance has a convulsed appearance; the lips are drawn somewhat to one or both sides; the pulse is more or less developed, sometimes irregular and trembling, and is rarely at this period feebler or slower than natural; the tongue presents the same appearances already noted; the thirst, and frequently the vomiting, still continue. The temperature of the head continues excessive, but occasionally fluctuates, whilst that of the rest of the body is often not materially augmented.

157. *c.* To this state succeeds more or less marked exhaustion, which should not be taken for commencing resolution of the disease. The patient ceases to scream; and the symptoms of violence subside; but to these succeed startings of the tendons, carphologia, convulsive motions, and sometimes clamps, chiefly in the upper extremities. The pupils are dilated, contract with difficulty on exposure to light; the eyes are rolled in their orbits, become insensible, as well as the other senses, to the ordinary excitants; and a complete calm takes the place of the violent delirium; the patient even not answering questions put to him. He has had no sound sleep excepting a fatiguing stupor; he is now plunged in a profound coma. The limbs are, up

to this time, rigid and contracted, but soon become completely relaxed. This state is owing, generally, to the effusion of serum, which has now taken place; but it sometimes may exist without increased effusion; injection and congestion of the vessels of the brain, or compression, from whatever other cause, also producing it. At this period of the disease the face is pale, the eyes inexpressive, dim, half open, and drawn upwards; the cheek bones prominent, the temples hollow, the nose pinched, the ears cold; the lips dry, applied closely to the teeth, which are covered with a fuliginous coating at their base; the tongue is dry, hard, and brown; deglutition difficult, the abdomen distended with flatus, and the feces and urine voided involuntarily. The skin is either cold, or covered by a viscid sweat; the pulse is small, unequal, or irregular; the respiration slow, sometimes stertorous; the expired air is cold and fœtid; and the patient dies generally in the course of a very few days, or from two to three weeks, and but rarely later.

158. These are the principal symptoms of acute meningitis of the cerebral hemispheres. They present irregular periods of exacerbation; the heat of skin and character of countenance varying at different times without any evident cause. The stages of the disease are not precisely marked; either of them may be wanting, and sometimes they seem as if confounded with each other. When the disease *terminates favourably*, the symptoms subside gradually; resolution taking place, sometimes with, but as frequently without, critical phenomena.

159. According to the observations of MM. PARENT, MARTINET, and ROSTAN, when the *membranes of the base of the brain, or of the ventricles*, are the seat of the inflammation, the symptoms are somewhat different. The patient then experiences less delirium, or even preserves his intelligence almost entire; his faculty of attention, and some of the other intellectual powers, being only diminished. He answers slowly, but rationally, to questions put to him; somnolency is almost continued, and coma more quickly supervenes. In other respects the symptoms are the same. Cephalalgia is complained of chiefly at the bottom and above the orbits; in general, the symptoms of irritation and excitement are less strongly pronounced than in the preceding form of the disease.

160. *B. Chronic meningitis* differs from the acute chiefly in the less intensity of the symptoms, and slow progress of the disease. In many cases the functions of sense and locomotion are but slightly disturbed, and usually the intelligence is unimpaired; at least, as long as the inflammation does not affect the membranes of the convexity of the hemispheres. When seated, however, in this place, according to M. BAYLE, who has devoted considerable research to this subject, delirium frequently is also present, but it is seldom violent; sometimes it is taciturn; and the patient generally is engaged with lofty or ambitious ideas.

161. Chronic meningitis commonly succeeds to the acute form of the disease; but it often presents the chronic characters from the commencement. There is generally continued head-ach, with slight somnolency, sluggishness, incapacity and want of desire for intellectual

exertion, moroseness, irritability of temper, sometimes confusion of ideas, embarrasment of speech, and delirium, terminating in confirmed mania or maniacal idiotcy. The motions of the limbs are slow, difficult, or painful, and their muscles are subject to involuntary motions and twitchings, and sometimes are not under the control of volition, or are altogether paralytic. Vomiting and convulsions are rarely present, excepting in *infants*, where they are often the chief or almost only signs. In *children*, the peculiar knitting of the eye-brows, retraction of the angles of the mouth, whining or peevish cry, stupor, grinding of the teeth, scanty urine, obstinate costiveness, and increased heat of the head, are the chief symptoms; these being similar in kind, but much milder in degree than those accompanying the acute or sub-acute states of the disease. In many cases, both in children and adults, the functions of organic life present but few lesions of a marked description until towards the last period of disease, or shortly before death. It will be perceived that many of the phenomena here stated, belong to disease of the brain,—a circumstance which must necessarily obtain; for as the membranes surround the whole of this organ, and are one of the chief media of distributing the blood-vessels to it, any disease affecting its structure, or modifying the quantity or properties of the fluid secretion furnished by these membranes, for its protection, &c., must necessarily implicate the state of its functions.

162. *C. The duration of meningitis* necessarily varies with its intensity. In its *acute* form it extends from three or four days to twenty-eight, and even thirty; but more frequently from seven to fourteen days. In many cases it is difficult to assign the period of invasion; pain and somnolency having been complained of even for days before the occurrence of chills or rigors. The disease also not infrequently supervenes on other affections, and occasionally becomes complicated with them, particularly in the course of *hooping-cough*, and diseases of the *prima via*, when its invasion may be overlooked, or with difficulty ascertained. The more *chronic* states of meningitis have no determinate duration: they may proceed gradually and in a slight form, when, unexpectedly, from some exciting cause, or even without any evidence of such occurrence, they may assume an *acute* character, and terminate more or less rapidly.

163. *D. The organic changes* consequent upon inflammation of the cerebral membranes are observed chiefly in the *pia mater*, the *arachnoid*, and the reflection of the *arachnoid* covering the *dura mater*; and not infrequently, also, in the *cineritious substance* of the brain. These consist principally of injection and impregnation of the *pia mater* with blood, &c.; loss of the transparency of the *arachnoid*; effusion of serous or sero-albuminous fluids; and the various lesions particularly described in the preceding sections (§ 22—28.).

BRAIN—INFLAMMATION OF ITS SUBSTANCE.

SYN. *Phrenesis, Phrenismus*, Auct. Var. *Encephalitis, Enkephalitis*, Hildenbrand. *Cephalitis*, Auct. Var. Recent. *Encephalite*, Bouillaud and other French Pathologists. *Cérébrite*, Foville. *Cephalitis Profunda*, Good. *Gehirnentsündung*, Ger.

164. *DEFIN.* Pain of the head; vertigo; altered sensibility; spasms, or contractions, of one or more limbs; excited or deranged functions of sense and intellectual power; rapidly terminating in coma.

165. I have stated that meningitis manifests itself to our senses chiefly by the lesion of the cerebral functions; and that this is occasioned in two ways, viz. by deranging and impeding the functions of the brain, which these membranes are intended to facilitate; and by imparting the inflammatory action to those parts of the brain contiguous to them. But although the relative connection of parts thus necessarily increases the difficulty of distinguishing the symptoms proper to the membranes, or to the brain itself, still there are certain signs which enable us to infer the degree to which either may be separately affected. We shall see in the sequel, that, in cerebritis, the organs of voluntary motion exhibit frequently morbid phenomena which are generally limited in extent; whilst we have seen, in meningitis, these organs are affected generally, and seldom or ever partially, excepting when complicated with inflammation of some portion of the brain; and if, in cerebritis, all the voluntary actions are affected, the inflammation has commenced in the membranes, and extended itself to the substance of the brain,—the disease existing as meningitis and cerebritis conjoined, which is, perhaps, its most common state, and in which I shall presently consider it.

166. *SYMPTOMS.*—*A. The more immediate function. derangements.* The functions of the brain consisting of sensation, volition, instinctive desires, intelligence, and moral sentiments, it is evident that the phenomena of the disease should be sought after in this series of manifestations; and that they will vary, in respect of their particular states, their intensity, and progress, according to the seat, the nature, and extent of the organic change.

167. *a.* When *cerebritis* is general, it often presents the same functional disturbances, and the same progress and stages, as meningitis: it is, indeed, very probable that both diseases co-exist, and that the inflammation commences in the pia mater. However, when the whole cerebral mass is inflamed, coma, with relaxation of all the limbs, takes place much earlier than in meningitis; and the disease develops itself with extreme rapidity; the symptoms of vascular excitement scarcely showing themselves, or, at least, for a very short time; and being frequently altogether absent. This difference is readily explained, when we consider that, in meningitis, the brain being only secondarily and slightly affected, it may still exercise its functions, although in a deranged manner; whilst in general cerebritis, the change being extensive, its functions must necessarily be suspended. The patient, after a rigor, which ushers in this as well as the majority of other inflammations, sometimes loses recollection; but he has generally experienced other symptoms previously, such as obstinate pain of the head, twitchings, pricking sensations, slight numbness or diminution of the sensibility, with painful muscular action, vertigo, sudden want of recollection, and tinnitus aurium. Sometimes the sensibility is morbidly increased at this stage, as well as the functions of sense; the intellects are active, or excited; and there is watchfulness, with other

analogous symptoms, for a longer or shorter period before the patient is seized with rigors and insensibility.

168. *b.* These *precursory symptoms* M. ROSTAN considers as the result of an incipient disorder, which he conceives to be local congestion, and that inflammation has not then taken place; but they are, more obviously, signs of an early period of inflammatory action. These symptoms are frequently accompanied with general signs of plethora or determination of blood to the head: the pulse, particularly of the carotids, is hard, or full and developed; the countenance is injected; the skin hot, &c. The same precursory signs are likewise observed in softening of the brain; but in this affection the pulse is not augmented in frequency or fulness, the skin is cold and pale, and the countenance pale or shrunk. The symptoms now described indicate, at least, that morbid action has commenced in the brain; and that it is not so extensive or intense as not to subside under judicious treatment. But when the patient has had rigors, the functional disturbance, especially of locomotion, is particularly marked: then ensue clonic or tonic spasms of the muscles, such as startings of the tendons, carphologia, convulsions, cramps, rigid contraction of the limbs, &c. At a more advanced period, particularly when effusion supervenes, paralysis or relaxation, and loss of sensibility of a limb or limbs, take place.

169. *c.* When cerebritis is general (which is never the case without the pia mater being inflamed), these symptoms affect all the limbs simultaneously; when local, only some of them, according to the seat of inflammation. Spasms, convulsions, or paralysis, affect also the muscles of the face; there is a falling down of the upper eyelid; the eyelids are shut and contracted; the commissures of the lips are drawn to one side, either by their natural tonicity, when the antagonist muscles are paralysed, or from a morbidly increased action. Sometimes this exists on both sides, producing retraction of the angles of the mouth. Very frequently the muscles and limbs are remarkably painful; so that, when attempts are made to move them, or to straighten those that are contracted, or upon attempting to move himself, the patient screams out.

170. *d.* In *partial cerebritis*, the action of the muscles and the sensibility of the surface are also partially, but not permanently, affected; some parts being less disordered, whilst the affection extends to others; or they all become more severely and permanently diseased; the spastic contractions, which existed at first owing to inflammatory irritation, giving place to paralysis, in consequence of pressure or disorganisation. The intellectual faculties are also frequently disturbed. The patient's answers are abrupt, rapid, sometimes incoherent, and at other times made very slowly. When merely one hemisphere is affected, it has been supposed that the functions of the other will proceed so as to prevent the appearance of much disturbance of the mental faculties; but this may or may not be the case; and, at least, can only occasionally obtain. The mental disturbance, which is extremely various in its forms and states, according to the part of the brain affected, exists only during the first days of the disease, and is soon displaced by coma.

171. *c.* At the commencement, particularly when cerebritis is general, or affects the periphery or more superficial parts of the brain, as in meningitis, or meningitis complicated with superficial cerebritis, the functions of the senses are morbidly increased, the least light or noise, or the slightest touch, being insupportable; but when the disease is seated in the centre of the brain, where the senses transmit their impressions, there is either perversion, or complete loss, of these functions. The pupils are then frequently dilated and insensible; the eyes unaffected by light, the ear by sounds; and the other senses are similarly disturbed; the patient is either watchful, or is oppressed by a somnolency intermediate between sleeping and waking; and numbness, with twitchings, or local convulsions, are generally observed.

172. In the course of a period, varying from one to three or four days, or sometimes earlier, and occasionally later, the symptoms are changed, owing to the local affection having advanced to disorganisation. At this period, copious effusion of serum often takes place, occasioning symptoms of compression. The spasms and convulsions are replaced by relaxation and immobility; and the senses are paralysed, not only on the side opposite to the cerebral lesion, but on both sides simultaneously, owing to the healthy parts of the brain being compressed by the effused serum, or by the tumefaction of the parts inflamed. Sensibility diminishes rapidly, and is at last abolished; the intellects are obscured, and at last overwhelmed, and the patient becomes profoundly comatose, or, in the less acute or chronic cases, hemiplegic, and sometimes ultimately apoplectic, or epileptic.

173. *B. The mediate symptoms.*—During the first days of the disease, the countenance is full and coloured; the eyes brilliant and animated, their expression unusual; the temporal arteries, as well as the carotids, beat strongly; there is no appetite; the tongue is white, loaded, red at its margins and point, and the papillæ developed; there are nausea and vomiting; the bowels are costive; but occasionally in children there is diarrhoea from the commencement, and the evacuations are morbid and offensive; the skin is warm, the pulse strong and frequent, and the respiration accelerated. At a later period, a very manifest change ensues: the countenance is expressive of pain, irritation, and chagrin; the features begin to sink, and become pale; the eyes dull and half closed; and thirst is no longer complained of; deglutition is difficult, or cannot be accomplished; vomiting is produced with difficulty; the abdomen is distended with flatus; and the fæces are passed involuntarily, as well as the urine, which sometimes accumulates in the bladder from paralysis of this organ; the skin becomes cold, or covered by clammy sweat; the pulse is unequal, irregular, or variable; the respiration laboured, or stertorous; and the patient sinks. In rare cases, at this stage of the disease, the symptoms diminish, and the functions gradually assume their natural states, either with or without the occurrence of phenomena which may be regarded critical. The alterations of structure produced by cerebritis are fully described in preceding sections of this article (§48, & seq.).

BRAIN—INFLAMMATION OF THE MEMBRANES AND SUBSTANCE OF THE. SYN. *Phrenitis* (from *φρην*, the mind); *Encephalitis*,

Cephalitis (from *κεφαλή*, the head) FRANK and HILDENBRAND. *Phénéisie*, *Encéphalite*, Fr. *Hirnentzündung*, Ger.

174. DEFIN. *Violent pain in the head; prominent suffused eyes; flushed countenance; violent delirium, followed by profound sopor.*

175. Having described inflammation affecting chiefly either the membranes, or the substance of the brain, I now proceed to consider inflammation attacking these structures simultaneously, or rapidly extending from the one to the other, chiefly from the former to the latter. This is certainly the more common form in which inflammation seated within the cranium manifests itself in adults, particularly in hot countries, and in temperate climates during hot seasons. In children, however, a more or less evident limitation of the inflammatory action to either the membranes, or the cerebral substance, especially the former, is frequently perceived; and the same remark may be extended to aged persons, in whom the substance of the brain is more liable to be affected, chiefly in a sub-acute or chronic form. That the division which I have made of inflammations of the brain, is founded in truth and that their diagnosis may be established in practice by a judicious and experienced physician, I have had numerous opportunities of proving at the Infirmary for Children, where the cases admitted with inflammations seated within the head have been entered as cases of meningitis, cerebritis, or encephalitis, as the membranes, the substance of the brain, or both, respectively, were considered chiefly affected.

176. It may be supposed, that the distinctions argued for, granting their accuracy, tend to little practical advantage. This is, however, a very serious mistake; and I cannot more fully demonstrate it, than by the following fact:—About ten years since, I was requested to see a child, attended by an able and scientific practitioner, who considered the case as meningitis, which had terminated in effusion; or, in other words, of acute hydrocephalus in its advanced stage, and perfectly beyond the reach of art. After an attentive consideration of its history and existing state, I expressed the opinion, that the disease was inflammation, chiefly affecting the substance of the brain, and that a decided treatment founded on these views might still be successful. Leeches applied behind the ears, and around the occiput, with the means which will be hereafter detailed, succeeded in restoring the child to health in a few days. Since this instance, I have witnessed similar mistakes. The diagnosis, prognosis, and the treatment adopted in these cases proceeded on the important fact already stated (§167.), that cerebritis will, owing to the turgescence of the inflamed organ, give rise at a very early stage of the disease to the most profound coma, relaxation of the limbs, and many of the symptoms occasioned by effusion of serum; whilst the greater temperature of the head, and strength of the pulsation of the carotids in the former, will often, independently of other signs connected with the history of the case, evince its real nature.

177. SEAT.—In the greater number of cases, inflammation commences in the pia mater, and extends itself to the arachnoid on one side, and to the cortical substance of the brain on the other;

and not infrequently also to the arachnoid covering the dura mater, and the deep-seated structures of the brain. It is also very probable, that more than one of these different structures may be nearly simultaneously affected. It may, however, originate differently when it arises from external injury; as in the dura mater, the substance of the brain itself, or the arachnoid.

178. I. SYMPTOMS. — *A. Premontitory.* Encephalitis generally commences with a sense of heat and fulness in the head; frightful dreams, and unquiet sleep; forgetfulness; confusion of ideas; dimness of sight; vertigo; turgidity of the face and eyes; and moroseness of temper. These symptoms generally precede the occurrence of chills or rigors, and are entirely absent when the disease proceeds from external injuries. In *children*, unusual somnolency, or wakefulness; startings in sleep, or fretfulness; aversion from sudden or quick motion; dyiness of the mouth and nostrils; and not infrequently a voracious appetite; are the chief precursory symptoms.

179. *B. The invasion, or first stage of encephalitis*, is indicated by severe chills or rigors; to which succeed a burning heat of the head; urgent thirst; sometimes, even thus early, an unnatural absence of thirst, and violent delirium, jactitation of the body; intolerance of light; fixed, pulsating, heavy, compressing, and most severe pain of the head, alternating frequently with stupor. Febrile heat rapidly increases; and the head becomes more turgid, and hotter; the eyes more prominent, suffused, watery, and intolerant of light; the pupils are contracted; the eyelids are generally shut, or imperfectly open; the eyebrows are knit; and the countenance is threatening and fierce. Hearing is quicker, is attended with ringing in the ears, and intolerance of sound. Epistaxis sometimes occurs, generally to a small extent, and with only transitory benefit. Insomnia, and delirium of various forms—morose, taciturn, furious, &c.—supervene; and, in proportion as the cerebral organs are excited, those viscera which are supplied with the ganglionic nerves are rendered torpid, the patient being insensible to the wants of the digestive organs.

180. *C. The second, or advanced stage*, is generally characterised by a marked diminution of the sensibility, which was in the preceding period morbidly increased. The pulse, which was at first frequent, hard, and full, becomes slower, fuller, and softer; and, in some cases, quicker, smaller, or harder. The skin is dry; the urine scanty, and high coloured; the tongue is dry, and loaded at the root; the bowels constipated. In some cases, particularly those in which the cerebral substance is early and generally inflamed and turgid, instead of phrenetic delirium, an apoplectic sopor, often preceded by convulsions, quickly supervenes; with a slow pulse; stertorous, slow, or laborious breathing; turgid or bloated countenance; startings of the tendons; involuntary evacuations; torpor of the senses; and flaccidity of the limbs. In those cases in which delirium is present, and the pulse quick and hard, a similar state of coma to that now mentioned takes place sooner or later, if not averted by medical aid. In the one, the first stage is short and indistinctly marked; in the other, it is long, and often continuing the greatest part of the whole duration of the disease; the second

stage sometimes appearing suddenly, and terminating rapidly. In both these states of the disease, the difficulty of swallowing is great, so that fluids are sometimes regurgitated by the nose; and when the substance of the brain is chiefly affected, deglutition is often nearly, or altogether abolished in the most intense cases. In this stage, the pupil becomes at first dilated, and occasionally again contracted; the patient, in some cases, squints, or has double vision; his speech is often much affected; and his mouth is drawn to one side. Deafness also comes on, or increases; and the sopor, or coma, is more profound—most probably owing either to incipient effusion of fluid, or to greater turgidity of the capillaries and veins, or to both these combined, in a part or the whole of the encephalon. The comatose symptoms appear early or late, according to the intensity of the disease, the extent to which the cerebral structure is affected, and the tone and energy of system. They sometimes partially subside, again recur, or alternate with convulsions. As the disease advances to an unfavourable termination, the pulse becomes remarkably quick, irregular, or intermittent.

181. *D. Duration.* — Encephalitis usually reaches its acmé about the third or fourth day. It then continues in full strength for several days, exhibiting slight remissions and exacerbations, and simulating continued fevers. In favourable cases, a change is sometimes observed on the fifth, seventh, or some other critical day, unless a fatal termination occur; and is generally attended with either copious perspiration, or hæmorrhage from the nose, free evacuations from the bowels, or a discharge of urine depositing a copious sediment. The disease may assume a *sub-acute* or a *chronic* form, presenting a diversity of symptoms, especially in its chronic state, according to the particular part of the brain affected; or it may proceed in a very slow, slight, and insidious manner, and escape detection until a dangerous or fatal change has taken place. The more chronic states may follow an imperfectly cured acute attack; and the latter may suddenly supervene on the former.

182. II. CAUSES. — *A. Predisposing.* The sanguineous and nervous temperaments; the epochs of infancy, childhood, and youth—particularly to meningitis; the period of dentition; advanced age—especially to cerebritis in a sub-acute or chronic form; the male sex; a large head and short neck; children of scrofulous parents, and those who evince precocious talent or acquirements; persons subject to perspirations or eruptions on the head; early or habitual exertions of the mental powers; the indulgence of the more active passions and affections; encouragement of vindictive feelings; anger; continued watchings; venereal excesses; the use of spirits, and narcotics, as opium, tobacco, &c.; a too warm state of the head; suppression of epistaxis, hæmorrhoids, or of any other accustomed secretion or evacuation; the neglect of sanguineous depletion after the habit has been established; the healing up of chronic ulcers and eruptions; and other disorders of the brain,—are most frequently the predisposing circumstances and causes of the disease.

183. *B. The exciting causes.* — *a.* Those which act more directly on the encephalon, are blows, fractures, falls, counter-strokes or concussions of

the head, all which may not be followed, for many days, by any evident symptoms; whirling children in the air, or tossing them in order to quiet them, or rocking them rudely in cradles; the improper use of narcotics and stimulants in order to quiet them; the action of the sun's rays; protracted study; excessive joy; violent fits of anger, excessive desire, jealousy, and all the exciting passions; unusual exertion or irritation of the senses of sight and hearing; exostoses on the inner table of the skull; and the absorption of purulent or morbid matters into the circulation. *b.* The causes which act more remotely or indirectly, are the diseases with which I have stated encephalitis to be sometimes complicated (§ 186.); nervous or bilious headaches; all painful affections; mania; inflammations of the ear; disorders of the stomach, diaphragm, liver, and bowels; affections of the sexual organs; ingurgitation and intoxication; the exanthemata, particularly when imperfectly developed on the external surface, or upon the disappearance of the eruption; the metastasis of gout, rheumatism, and erysipelas; suppressed hæmorrhages and evacuations, particularly the menses and the urinary secretion; the accumulation of sordes and morbid secretions in the *prima via* and gall bladder; the ingestion of irritating and narcotic poisons; indulging in cold punch (FRANK); violent fits of coughing; long exposure to great cold; and, according to GOELIS, the too free use of *belladonna*, and other narcotics, in the cure of whooping-cough.

184. III. *DIAGNOSIS.*—*A. Characteristic symptoms.* *a.* Pain is an early sign, but the patient often ceases to complain of it very soon, particularly if the cerebral substance be chiefly inflamed; when it is also gravative, and attended with stupor from the commencement. It is most acute when the membranes are affected, and is always aggravated by shaking the head, and the erect position. When the disease supervenes in the progress of fevers and bronchial affections, pain may not be complained of, owing to the impure state of the blood having blunted the sensibility. *b. Watchfulness and sleep.*—Insomnia is generally present during the first days, when the membranes are affected; and, in children, starting from sleep, and screaming. Heaviness, somnolency, sopor, or even coma, often preceded by convulsions, are early present when the substance of the organ is the chief seat, or the membranes extensively affected; and supervene early, but without convulsions, when the disease occurs in the course of fevers and bronchial affections; but a refreshing sleep is never enjoyed, unless after a favourable change. *c. The senses,* particularly sight, hearing and touch, are all morbidly active in the first stage, especially when the meninges are inflamed; but they are nearly abolished at this period, when the cerebral substance is chiefly affected. The eye often indicates mental oppression, even when bright and staring. The sensibility of the surface is unnaturally increased in meningitis or superficial cerebritis, but is diminished when the substance of the brain is deeply affected, and in the advanced stage, when the membranes generally are inflamed. In partial cerebritis, the sensibility of a limb, or part only, is often lost, and it may be conjoined with spastic rigidity, or paralysis, of the same or of another part. *d. The intellectual and moral faculties are more or less dis-*

ordered; they are unusually excited, or violently deranged, early in the disease; but sopor frequently supervenes without being preceded by this state, when the cerebral structure is inflamed. Reverie or wandering of the mind during night, is the least important form of mental disturbance, indicating a slight affection of the pia mater, extending to the cineritious substance; delirium through the day, and watchfulness in the night, are the most dangerous, and attend a severe affection of the membranes. *d. The respiration* is often quicker in proportion to the pulse in the first stage, and slower in the second; and in the torpid or somnolent state, when the substance of the organ seems chiefly to be affected, is often attended by deep-drawn sighs. *e. The digestive organs* are much affected, particularly in children. There are nausea and vomiting, especially at the commencement, and torpor of the bowels. As the disease advances, however, the bowels often become free, or even relaxed. *f. The muscles and limbs* are more or less pained, contracted, convulsed, particularly in the first stage, and when the cerebral structure is inflamed. The convulsions are often general or severe, on the supervision of the disease, in young subjects. They may be soon followed by coma, which may pass off, and the convulsions again recur, and terminate life. When the cerebral substance is partially affected, the spasms and contractions may be confined to one or more limbs, whilst the rest are relaxed; or complete paralysis may ensue. In the last stage, muscular power is generally lost, and the limbs are flaccid. *g. The pulse* is extremely variable. At first it is not remarkably frequent; but it often becomes slower, and again quicker than ever, and at the same time weak, small, irregular, or intermittent. It may be at one time either slow or frequent, and in a few minutes the reverse; but it is never natural in respect of fulness, regularity, or strength. It is generally stronger and fuller in the carotids than elsewhere; and in this situation it ought always to be felt.

185. *B. Encephalitis* may be mistaken for other diseases; but if attention be paid to the history of the case, and the descriptions now given, this can scarcely happen. It may, however, be confounded with fevers, apoplexy, delirium tremens, mania, and nervous headaches. *a. In fevers*, the disturbance of the cerebral functions, when prominently marked, generally occurs in their progress, as a complication or consecutive affection. The pulse is always more uniformly frequent and regular than in encephalitis; spasms, convulsions, or paralysis, seldom occur, unless the brain becomes inflamed; respiration is not laborious, nor deglutition difficult; nor are the eyes, countenance, and speech affected, as in encephalitis. In idiopathic fever, the muscular power is depressed from the commencement, but is neither generally nor partially affected by spasms, contractions, or paralysis; and the stomach is less remarkably disordered. There is not observed that falling of the pulse from its former frequency, afterwards followed by great rapidity, trembling, or irregularity, which take place in encephalitis. In fever, the general febrile symptoms are the earliest and most apparent disease; in encephalitis, the functions of the brain, of sense, and of the organs of volition, are prominently and early disordered, and the febrile symptoms much less re-

markable in proportion to the severity of the cerebral disease. When the coma is profound in encephalitis, the heat of the whole body, excepting the head, is either not augmented, or depressed. The delirium in fevers also occurs at a remoter period, and is much less violent in its character, than in encephalitis. *b.* The disturbance of the organic, and particularly the digestive functions, the presence of fever, and the acute character of the disease, distinguish it from *maniacal insanity*. *c.* The same symptoms, with the frequent addition of delirium, of disturbance of the senses and general sensibility, spasms or convulsions, somnolency, sopor, and paralysis, preclude the possibility of confounding it with *bilious* or *nervous* headaches. *d.* Somnolency, sopor, convulsions, and slowness of the pulse, distinguish it from *delirium tremens*, in which the spectral illusions, the remarkable tremors, timidity; copious, clammy, foetid perspirations; and the specific cause of the affection; sufficiently characterise the latter, when occurring in a distinct and uncomplicated form. *e.* The spasmodic or convulsive symptoms, antecedent delirium, the mode of attack, and progress of disease; the absence of paralysis, or its slower accession when the brain is inflamed, distinguish encephalitis from *apoplexy*, in which the invasion is sudden, or more rapid, and the paralysis a simultaneous or consecutive symptom. The relation, however, between apoplexy and encephalitis is often intimate, particularly in cases of partial inflammation, or inflammatory softening, of the substance of the organ.

186. IV. STATES, FORMS, AND COMPLICATIONS. — Besides the more or less perfect limitation of inflammation to either the membranes or the substance of the encephalon, other states may present themselves deserving of remark. *a.* Encephalitis may result from the *metastasis* of gout, rheumatism, and erysipelas, or it may arise from the extension of the last-named disease to the brain. In these cases the membranes are chiefly affected; stupor and coma come on early, and are attended with general flaccidity of the limbs, subultus tendinum, involuntary evacuations, and slowness of pulse; but local cramps, convulsions, or paralysis, are seldom present. *b.* The disease may be also *consecutive* of other diseases, as of inflammation of the ears (§ 58.), of the bones of the head or pericranium. In these cases it is first extended to the membranes, and afterwards to the substance of the organ; occasioning contraction, spasms, or paralysis of one or more limbs, or muscles of the face, terminating in coma, or alternating with stupor and general convulsions. It may also be consecutive of severe ophthalmia, inflammation of the parotids or testes, of the kidneys, of inflammation of the mucous surface of the bowels, especially in infants, and of the diseases of the lungs. *c.* Encephalitis may likewise *supervene on*, and be complicated with, the advanced stages of continued and remittent fevers, bronchial and pulmonary affections, whooping cough, exanthematous fevers, particularly scarlet fever, and small pox. In all these cases the membranes and superficial parts of the brain are principally affected, generally in a more or less diffused manner, occasioning first delirium, general convulsions in young children, great pain in the limbs, sensibility and soreness of the surface, followed more or less rapidly by sopor, coma;

more rarely by local spasms and paralysis, involuntary evacuations, rapid irregular pulse, &c. The complication with typhoid, continued and exanthematous fevers, especially those of certain epidemic constitutions, is extremely frequent and important; and have given occasion for the opinions entertained by WILLIS, CHIRAC, WENHOF, REIL, PLOUQUET, CLUTTERBUCK, and MARCUS, respecting the proximate cause of fevers. To this complication also TORRI attributes the malignancy occasionally assumed by the remittents and intermittents of the south of Europe. When it thus supervenes on fevers and bronchial diseases, the symptoms are often more insidious, and of a less violent character, although the disease is equally rapid and disorganising. This is probably owing to the depressed state of the vital manifestations, particularly of the organic nerves and vascular system. Owing also to this circumstance, encephalitis, when thus complicated, requires a modified and less depletory treatment. Inflammation of the brain is also not infrequent after apoplectic seizures, particularly in the part of the organ surrounding extravasated blood. In these cases the disease generally occurs from five or six to ten or twelve days after the attack, and is attended with many of the symptoms of partial encephalitis, particularly spasms, paralysis, delirium, &c.

187. V. TERMINATIONS AND PROGNOSIS. — *a.* This is always a dangerous disease, and therefore a very cautious *prognosis* ought to be given. The termination of encephalitis in *health* occurs most frequently in persons of a sound constitution, and who have no hereditary disposition to the diseases affecting the encephalon. This change often occurs on critical days, when it is generally attended by some favourable occurrence, as a copious discharge from the bowels; a genial and universal perspiration; a copious discharge of urine, depositing a sediment; hæmorrhage from the nose, or the presence of the menses; a more natural state of the pulse and respiration; a quiet undisturbed sleep, distinct from the oppressive somnolency or sopor which is one of the chief signs of the severity of the disease; a more moist, natural, and clean state of the tongue and gums; a decline of the temperature of the head, and of all the other symptoms.

188. *b.* A *fatal termination* may take place, 1st, In the inflammatory stage, owing to the very general extension of the disease to the membranes and substance of the organ; the pressure and interrupted circulation arising from the turgescence of the inflamed organ annihilating its functions (§ 48, 167.): 2d, In a further advanced stage, from an effusion of serum, sero-albuminous fluid, or the deposition of false membranes (§ 21—28.): 3d, In the less acute cases, and at a still more advanced period, from suppuration or inflammatory softening of a portion of the brain (§ 50—76.): and, 4th, This issue may proceed from any two, or the whole, of these changes being conjoined in the same case. The indications of an unfavourable termination are, the persistence of the urgent symptoms after treatment; violent delirium, watchfulness, and restlessness; profound lethargy or coma, or the alternation of these states; violent general convulsions, followed by coma, or alternating with it; a morose delirium; retraction of the head; severe pains of the limbs, followed by cramps,

contractions, or palsy; hæmorrhage from the ears; difficulty or impossibility of deglutition; strabismus, or double vision; loss of speech; slowness of pulse, followed by a sudden increase of frequency; a trembling or irregularity of pulse; obstinate vomiting, particularly of a greenish fluid; singultus, continued or recurrent; the rapid healing of chronic ulcers; the appearance of the disease in the course of other maladies, particularly pneumonia, the exanthemata, and after apoplexy, and in the scrofulous habit, or in persons having an hereditary disposition to cerebral affections, or who have been recently affected by other maladies.

189. c. The disease may pass into an obscurely chronic form, which, together with the effects produced by its antecedent state, may give rise to paralysis, epilepsy, various states of mania or mental disturbance, idiocy, &c. In these cases, many of the chronic changes which have been described as occasionally found in either the membranes or the substance of the brain, particularly those which affect parts only of these structures, have taken place, as softening, abscess, induration, tumours, ossific formations, &c. (§50.71.102, &c.).

190. d. When encephalitis arises from *rheumatism* (*Encephalitis Rheumatica*, J. FRANK), the membranes, particularly the dura and arachnoid, are chiefly affected; and the danger has been considered, upon the whole, less than in other states or relations of the disease. The disposition, however, to effusion, and to many of the chronic organic changes described as frequently found in the membranes, is great. It often assumes a sub-acute or chronic form, and is usually attended with great distress, but is without delirium. The *gouty form* of encephalitis generally is observed in older persons than the rheumatic; is accompanied with much disorder of the stomach, liver, and bowels, and with deficient vital power; and is hence a more dangerous state of the disease. The same remark is applicable to its occurrence from the extension or suppression of *erysipelas*. In these, the re-appearance of rheumatism or gout in a joint or extremity; the eruption of the erysipelatous inflammation in any part of the surface, even in the face (J. P. FRANK); the supervention of diarrhoea, the hæmorrhoidal flux, or any other discharge; are favourable circumstances. Encephalitis, occurring after the disappearance of the eruption in the exanthemata, or during the course of typhoid or epidemic fevers, or pulmonary diseases, or after attacks of apoplexy, paralysis, epilepsy, or mania, is much more dangerous than when appearing in a primary form, owing, 1st, to the depression of the vital and nervous powers; 2d, to the vitiated state of the circulating fluids; and, 3d, to the silent and insidious manner in which the disease of the brain often advances to disorganisation in these complications. According to HUSELUND, encephalitis, supervening on the disappearance of the variolous eruption, is generally fatal. The *alterations of structure occasioned by encephalitis* are fully described in preceding sections of this article (§11, *et seq.*).

191. VI. TREATMENT. — A. *Of the idiopathic and simple encephalitis*. It must be evident that the treatment should be the same, whether the membranes or the substance of the brain be chiefly, or entirely, the seat of disease. The *causes*, the

age, the habit of body, and apparent state of vital power, are circumstances which ought to be duly considered when adopting the means of cure, or determining upon the extent to which they ought to be carried. a. The *antiphlogistic treatment*, in all its departments, must be rigorously enforced. Some discretion is, however, required as to the extent to which it should be carried, and the direction, choice, and adaptation of the individual means of which it consists. In ordinary cases, bleeding from the jugular vein; cupping between the shoulders, nape of the neck, behind the ears, or occiput; leeches applied in those latter situations, and bleeding from the arm, are upon the whole the preferable modes. Arteriotomy I consider to be attended with no advantages; and in this I am supported by the opinion of HILDENBRAND and others; but bleeding from the feet, from the hæmorrhoidal vessels, and from the groins and insides of the thighs, are undoubtedly preferable when the disease arises from metastasis or the interruption of discharges, especially when conjoined with the treatment I shall presently describe as appropriate to those states. HILDENBRAND, and several other German physicians, recommend the application of leeches to the insides of the nostrils, when the patient has been subject to epistaxis, or if a disposition to critical epistaxis be evinced. As to the extent to which depletion should be carried, no precise opinion can be given. It should be regulated according to the circumstances of the case, and its effects upon the circulation, and be conducted in the manner I have recommended in the article on the *Pathology of the Blood* (§64.). It ought never to be relied on alone: other means should be simultaneously, or subsequently, employed, with the view of diminishing local and general action, and thereby preventing the removal of more blood than may be indispensable.

192. b. The hair should be removed from the head as soon as possible, and a *stream of cold water* poured upon it from time to time, or every second or third hour, until the temperature be reduced to the natural standard; and, as morbid heat soon returns, *cold epithems*, or evaporating lotions, or even pounded ice enclosed in a bladder, should be constantly applied in the intervals between the *cold affusions*, and the head be kept elevated, and placed upon a thick oil-skin, or, what is still better, upon a piece of common painted floor-cloth, as long as increased action continues. Cold applications or affusions may, however, be injurious if too long persisted in. They ought never to be continued after the temperature is depressed to the natural standard, or a little below it, particularly if sopor or coma be present; and as soon as the heat returns, they should be again resumed. Simultaneously with the affusion, the feet and legs should be immersed in warm water, or in warm water made irritating by means of salt and mustard, and the saphena vein be opened. In some cases, particularly when suppression of the menstrual or hæmorrhoidal discharge has preceded the attack, the *semicupium*, or *hip-bath*, may be substituted for pediluvia.

193. c. The immediate exhibition of *cathartics* should not be neglected. From ten to twenty grains of calomel may be given at once, and, three or four hours afterwards, an active purgative

draught, which should be followed by cathartic enemata, particularly the *En. Cathart.* and the *En. Terebinth.* (F. 441. and 150.). By these, or similar means, a copious action of the bowels should be procured and continued. With this latter intention, pills calculated to promote the abdominal secretions may be given each night, a purgative draught the following morning, and an enema subsequently, if it be necessary. Calomel combined with digitalis, or with antimony, should be prescribed in full and frequent doses, in addition to the above, so as to change the state of morbid action, particularly when the membranes are chiefly affected. The following, or similar medicines, may be used, and their effects carefully watched:—

No. 55. R. Calomel. gr. iij.—x.; Pulv. Jacobi Veri gr. iij.; Pulv. Digitalis (vel Pulv. Colchici) gr. j.—ij.; Syrup. Simp. q. s. M. Fiat Pilule ij. vel iij. tertia, quarta, vel sexta quaque hora porrigenda.

No. 56. R. Hydrarg. Submur. gr. iij.—vj.; Pulv. Jacobi Veri gr. ij.—vj.; Extr. Colocynth. Comp. gr. vj.; Syrup. Simp. q. s. Fiat Pilule ij. hora somni sumantur.

No. 57. R. Infusa. Sennæ Comp. 3jss.; Magnes. Sulphatis 3ij. (vel Potassæ Tart. 3jss.); Vin. Antimon. Tart. 3ss.; Tinct. Jalap. 3j.; Tinct. Cardam. Co. 3j. M. Fiat Haustus, primo mane sumendus.

194. d. In addition to these means, the frequent exhibition of *refrigerants* and saline medicines, especially those consisting of the *liquor ammon. acet.*, *potassæ nit.*, *antimonials*, &c., will be of much service. The preparations of antimony, judiciously exhibited, have a remarkable influence in diminishing determination of blood to, and inflammatory action in, the brain; and I believe that the effect will be more decidedly beneficial, if their operation as an emetic be carefully avoided. Form. 24. 359. 406. 436. 456. and 854. are of the above description, and, as well as others of a refrigerant and diaphoretic nature, may be employed, in small or moderate, and frequently repeated doses. I may state, as the result of considerable experience, that I have found the *saline refrigerants* and *antimonials* most beneficial during the early stage of the disease, and where the membranes were chiefly inflamed. In the stage of coma, or when the substance of the brain itself is affected; and the pulse quick, weak, small, trembling, or irregular, antimonials are not admissible; the preparations of *camphor*, with *liquor ammon. acet.* and *spirit. æther. nit.*, being preferable. (See F. 405. 436. 441.)

195. e. *Sedative* and *diuretic* medicines, particularly *colchicum* and *digitalis*, combined with the *liquor ammoniæ acet.* and moderate doses of camphor (F. 395. 400. 514.), are extremely useful in the early stage of the disease, after depletion and the free evacuation of the bowels. In the advanced stage, however, much less advantage will be derived from them. After blood-letting has been carried as far as may be thought judicious, and if much restlessness and jactitation be present, great advantage will be derived from the exhibition of a moderate dose of *camphor*, *hyosciamus*, and *James's powder*, in this or any other appropriate form:—

No. 58. R. Pulv. Jacobi Veri gr. ij.—v.; Camphoræ rasæ, gr. ij.—iv.; Extr. Hyoscyami gr. iv.—vj.; Syr. Papav. q. s. ut fiant Pilule iij. statim sumendæ et h. s. repetendæ.

No. 59. R. Mist. Camphoræ 3j.; Liq. Ammon. Acet. 3ij.; Spirit. Æther. Nit. 3ss.; Tinct. Colchici Semli. ℥ij. —xx.; Syrup. Papaveris 3j. Fiat Haustus, tertius vel quartus horis capiendus.

196. f. *Derivatives* and *counter-irritants* are useful in many cases, when judiciously prescribed. In the early stage of the disease, and whilst great irritability or delirium is present, they are often prejudicial, excepting simple pediluvia, the semicupium and hip-bath, employed simultaneously with cold applications to the head. Great mischief has arisen from ordering blisters and mustard poultices too early in inflammations, but more particularly in encephalitis, when, instead of deriving the circulation from the inflamed part, they excite the nervous and vascular systems generally, and thus react upon the disease. It is chiefly in the latter stage, when sopor or coma is present, that benefit is derived from them. Some difference of opinion has existed as to the part to which they—particularly blisters—ought to be applied. If the coma be profound, some writers have advocated the application of blisters directly to the scalp. Without denying the possibility of circumstances arising to justify this practice, I believe that they will seldom occur. The most profound sopor, weak action of the carotids, a not remarkably frequent pulse, and a temperature of the head much and permanently below the natural standard, would only induce me to apply blisters to the scalp. When *derivation* can be attempted with safety,—when sopor is present, and morbid sensibility and irritability has nearly disappeared, and depletion has been carried as far as seems judicious,—a large blister to the nape of the neck, or between the shoulders, or over the epigastrium, mustard poultices to the insides of the legs or thighs, or irritating liniments (see the *Liniments* in the Appendix) in the latter situations, will often be used with advantage. The *semicupium*, *warm bath*, or *pediluvia*, are seldom of service when there is much general febrile excitement, particularly in children, unless when used simultaneously with cold affusion on the head. But when the lower parts of the body have their temperature reduced below the natural standard, and when the disease has appeared after suppressed discharges, &c., they are often of service, and may be made more *revulsive* by salt or mustard.

197. g. Various remedies have been recommended in the treatment of this disease, in a more particular manner than others. Amongst these, the most generally employed and most beneficial is *calomel*, when given in large and repeated doses, and judiciously combined, and until an impression is made upon the disease, or state of the circulation. In the *meningitis* of children, this practice is particularly requisite, as, without it, but little impression will often be made on the disease; and, with due attention, but little risk will be run of experiencing unpleasant results from it. Where we dread impending exhaustion, the calomel may be combined with small doses of camphor and ammonia, and a less restricted regimen allowed. Marcus recommends strongly very large doses of *nitre*, which may be combined with antimony, or with diuretics; HEDGECOCK, the preparations of *mercury* carried to the extent of salivation; CHAUSSIER, the *boracic acid*, very nearly as prescribed in F. 343.; several physicians in Italy and in Switzerland, especially BRERA, TOMMASINI, PESCHIER, LAENNEC, &c., large and frequently repeated doses of the *tartarised antimony*, so as to act upon the bowels;

LOEFLEK (*Hufeland's Journ. der Pract. Arzneik.*, b. iii. p. 694.), free incisions of the scalp; and ARETÆUS (*Curat. Acut.* l. i. ch. 1.), CÆLUS (l. iii. ch. 18.), CÆLIUS AURELIANUS (p. 30.), and ZACUTUS LUSITANUS (*Med. Pr. Hist.* l. i. p. 85.), scarifications and cupping in the same situation. All these are undoubtedly advantageous, when judiciously prescribed. Besides these, there are remedies which are very generally employed, and which are beneficial in certain states of the disease only: these are, camphor, digitalis, hyoscyamus, opium, &c. In the early stage, camphor, unless in very minute doses, is prejudicial; but when sopor or coma is present, when depletion has been duly practised, the heat of the head has subsided, the energies of life are depressed or exhausted, and the symptoms are apparently the consequence of the lost tone of the capillaries of the brain, moderate and frequently repeated doses of this medicine are almost indispensable; particularly in the complications of the disease with typhus, or epidemic fevers, with gout or rheumatism. Digitalis as well as colchicum are principally required in the early stage, when either of them may be combined with calomel: if exhibited subsequently, they should be given with camphor, and their effects carefully watched. Both these medicines may be advantageously combined with aperients or with diuretics. BRERA recommends digitalis as follows in the earlier stages of the disease:—

No. 60. *R. Pulv. Fol. Digitalis* gr. xvj.; *Hydriarg. Submur.* gr. x.; *Pulv. Rad. Glycyrrh.* ʒj.; *Olei Junip.* q. s. *M. Fiat Pilule* viij. *Capit. binas tertius vel quartas horis.*

The combination of camphor with colchicum is often of service in the gouty and rheumatic forms of the disease. I found it recently of much advantage in a severe case of the latter.

198. *Narcotics* ought generally to be avoided; yet there are states of the disease, chiefly in adult and aged subjects, which are benefited by them. When lethargy or coma, or an obvious disposition to either, is present, narcotics are injurious, particularly in cerebritis; but when the membranes are obviously most affected, and the disease presents much of the phrenitic character; when great irritability, mental excitement, or exhausting watchfulness is present, particularly after depletions and other evacuations have been carried as far as seems judicious, and the pulse has been reduced, or become less febrile; a full dose of *hyoscyamus*, or even the preparations of *opium*, particularly the acetate or muriate of *morphine* (F. 315. 674.), the compound tincture of *opium* (F. 728. 729.), or *Battley's* sedative liquor, may be exhibited. In cases where the propriety of having recourse to these medicines admits of doubt, they should be combined with moderate or full doses of camphor (F. 554. 787.), or the *Spiritus Æther. Sulph. Comp.* (F. 375.)

No. 61. *R. Camphora* rasæ gr. j.—ij.; *Gum. Acacie, Sacchar. Albi*, ʒʒ ʒss.; *Magnes. Carb.* ʒj.; *Decocti Altheæ* ʒʒss.; *Spir. Æther. Sulph. Comp. Tinct. Hyoscyami*, ʒʒ ʒj. (vel. *Tinct. Opii Comp.* (F. 729.) ʒss. *M. Fiat Haustus.*

199. *B. Treatment of the complicated states.*—There are certain consecutive and complicated forms of the disease which require a somewhat modified treatment. *a. The rheumatic encephalitis*, according to J. FRANK, does not admit of cold applications to the head; in other respects,

the means of cure do not differ from those already stated. I believe that, in its advanced stage, the application of a blister to the scalp is more likely to be of service in this than in any other form of the disease; and the same remark may be extended to the use of *colchicum* and *camphor*—the latter of which may sometimes be advantageously combined with the tartrate of antimony or James's powder.

200. *b. In the arthritic complication*, after general and local depletions,—the latter chiefly on the right hypochondrium, hæmorrhoidal vessels, and insides of the legs,—followed by active purging, stimulating and irritating pediluvia, sinapisms and blisters applied to the lower extremities, and colchicum combined with the sub-carbonates of the fixed alkalis, and diuretics, are chiefly indicated.

201. *c. When encephalitis occurs in the course of fevers*, or when it is seated chiefly in the substance of the brain, and assumes a *typhoid* character, from the depressed state of the vital powers, either at the commencement or in consequence of treatment, the infusions or decoctions of *arnica*, *senega*, or *serpentaria*, have been recommended by the German writers, after depletions have been carried as far as seems prudent. When the disease is thus complicated, depletions should be employed with caution; and those which are local and derivative ought to be preferred, *revulsants* being simultaneously prescribed: cold applications to the head require equal caution. In the early stage of this complication, J. FRANK recommends a combination of camphor, cinnabar, and nitre, every two hours. The first of these is amongst the best medicines we possess in every stage of such cases; but it should, in the advanced periods, be exhibited in larger doses than early in the disease; and it may often be advantageously combined with calomel. A similar treatment is applicable when the disease appears in the course of *bronchitis* and other pulmonary diseases.

202. *d. The erysipelatous complication of encephalitis* often requires a more antiphlogistic and depletory treatment than the typhoid form of the disease; but such is not uniformly the case. I conceive that deep and large incisions into the scalp, particularly over the occiput, as recommended by LOEFLEK, would be more applicable to this state of the malady than to any other, especially if there be much tumefaction of the scalp or countenance. When encephalitis follows, or is complicated with *apoplexy*, the treatment differs in no respect from that which has been recommended for the primary form of the disease. Incisions or scarifications of the scalp may be also practised in this complication.

203. *e. The supervention of encephalitis on inflammations of the digestive mucous surface* is not infrequent in children; and in diseases of the liver in persons of middle age, or advanced in life. In these cases the treatment is not materially different from that already advised. Local depletions over the region of the liver; full doses of calomel, so as to affect the mouth; cold affusions on the head, particularly in the former state of complication; external and internal revulsants, and diuretics; are generally indicated.

204. *f. The appearance of the disease after irritating and narcotic poisons*, particularly after opium, aconitum, belladonna, &c., is not infre-

quent. These occasion, first, congestion, and afterwards inflammatory action. In encephalitis from these substances, vascular depletions, cold affusion on the head; emetics, or the introduction of the stomach-pump; camphor or arnica, combined with antimonials or aperients; external derivatives, and active purging; are amongst the chief means of cure.

205. *C. Of the treatment of the more unfavourable and anomalous states of the disease.*—The practitioner, although he will very frequently, or even generally, find the treatment described above successful, may sometimes meet with cases in which the symptoms persist, notwithstanding repeated depletions and the other remedies prescribed: the energies of life being more or less depressed; the pulse becoming very rapid, irregular, trembling; the coma or stupor more profound; and the temperature, even of the head, much diminished. He may or may not have had recourse to derivatives; but, in either case, they may be continued or varied; and camphor, musk, valerian, ammonia, HOFFMANN'S anodyne, and other restorative medicines, variously combined, may be exhibited. If the pulsation of the carotids, and temperature of the head, be not in such cases increased; or if they be diminished, and the energies of life be obviously depressed or exhausted, both in the affected organ and throughout the system; the above diffusible stimulants will often be inefficacious. In this case, the infusion of the flowers of arnica, or the infusion of serpentaria, either simply or combined with cinchona; camphor in larger doses, and given occasionally with calomel and small doses of opium; active frictions of the surface and lower extremities with rubefacient liniments; and in some instances, particularly if effusions between the membranes be suspected, with mercurial liniments, or inunction of the scalp; are the principal means that can be adopted. But if, notwithstanding those, the above symptoms continue or increase, — the evacuations being involuntary, and the patient unconscious of them; a vomiting, or rather a pumping up, of whatever is taken into the stomach, with singultus, and an intermitting, trembling pulse, that cannot be distinctly counted, being also present, — are we to continue to give the medicines which we have found inefficacious, thus leaving the patient to his fate? or are we to resort to still more active means? There can surely be no hesitation as to the part which ought to be taken. In a case of this description, consecutive of bronchitis, in a robust man of middle age, who was attended by Mr. FAXON, Dr. BREE, and myself, after depletions and cold applications had been carried as far as it was judged prudent, and blisters were applied on the epigastrium and nape of the neck, without benefit, full doses of calomel and camphor were given, the following medicines prescribed, and their action promoted by the enema terebinth. (F. 151. 7: —

No. 62. R. Mist. Camphoræ rasæ gr. iij.; Ammoniac Carbon. gr. iv.; Mucilag. Acaciæ q. s. Fiat Pilule ij., omni secundâ horâ, cum Haustu sequente, sumende.

No. 63. R. Mist. Camphoræ 3j.; Liq. Ammon. Acet. ʒjss.; Spirit. Æther. Sulph. Comp. 3ss.; Tinct. Capsici ʒj xij.; Syrup. Croci ʒss. M.

The following draught was also given, four hours after the exhibition of a large dose of calomel and camphor, with the view of deriving a circulation from the head, and of acting

decidedly on the abdominal secretions; and was repeated every hour until three were taken.

No. 64. R. Olei Terebinth., Olei Ricini, ʒs 3ij.; Tinct. Capsici ʒj xij.; Olei Cajuput. ʒj vi.; Aquæ Menth. Virid. 3jss. M.

The pulse soon afterwards became more distinct and regular, the bloated cast of countenance subsided, and all the symptoms improved. The patient afterwards quickly recovered, and is now in perfect health. At the time the above treatment was suggested by me, his recovery was considered almost impossible. Several years ago, I was consulted by Mr. HARRY COX respecting a very similar case, which was consecutive of erysipelas. In this a similar treatment to that now noticed was adopted, and the patient recovered from an extreme state of danger. This case is published in the twenty-third volume of the *London Medical Repository*. In those states of the disease which are characterised by profound sopor, depression of vital power, and the symptoms above referred to (§ 180. 205.), other means having proved insufficient, a judicious exhibition of the oleum terebinthinæ has very frequently a decidedly beneficial effect, particularly in the typhoid, erysipelatous, and other complications of the disease; and, when suitably prescribed, will generally allay the irritable state of the stomach, with which the worst forms of the malady are often attended even during their advanced stages.

206. The inexperienced practitioner should be aware that the existence of profound sopor or coma does not contra-indicate sanguineous depletions or cold applications to the head, if, conjoined with this state, the temperature of the head be at all increased, or the pulsations of the carotids strong or full. If these evidences of increased action be present, those important parts of the treatment ought not to be omitted; but the depletions should often be moderate or local merely; and, in my opinion, preferably from the scalp of the occiput or nape of the neck, by cupping, or by deep incisions of the former. When the disease is consequent upon suppressed discharges, a derivative intention may be had in view, and the lower extremities, the groins, the vicinity of the anus, &c., may be selected as the situations for depletion. In *traumatic encephalitis*, the fact that the disease either does not appear whilst the wound in the scalp remains open, or is averted by a long-continued discharge from it; and that the worst states of cerebritis often arise after injuries of the head, when the external wound has readily and prematurely healed, furnish a striking indication of the propriety of having recourse to incisions of the scalp in the other forms of the disease, and to issues and setons in the same situation subsequently, when their sequelæ indicate the propriety of having recourse to permanent irritation, with puriform discharge, for their removal.

207. *D. Treatment of the sub-acute and chronic states of encephalitis, particularly in children.*—

a. One of the most frequent forms of sub-acute inflammation of the brain is observed in *infants*, principally affecting the substance of the organ, and often terminating in dropsy of the ventricles. It is chiefly characterised by want of animation, by slight sopor, indifference to all objects, absence of sound sleep, and a state that is different from waking. The child is dull, but fretful and irri-

table u used or handled. The head generally droops, or reclines on one side; the countenance is usually pallid, but occasionally irregularly flushed; the eyes are dull, rolled about, or turned up; the pupils sometimes dilated, at other times contracted; and the infant often utters a plaintive moaning, and occasionally starts soon after having fallen asleep, as if pained or frightened. The hands are tossed about or raised to the head; the lower extremities alternately extended and drawn up to the abdomen; the head thrown backwards; and occasionally its temperature is slightly increased, whilst the heat of the rest of the body is either natural, or somewhat diminished. This grade of disease may continue for a long time; sometimes fluctuating, at other times passing into either a more acute or more chronic form, or at last terminating in dropsy; the bowels being either relaxed or irregular, but in either case with a morbid and offensive state of the motions. The shades of difference observed in this form of disease are numerous: the pulse is very variable, as well as the appearance of the tongue; which is, however, most frequently red at its point and edges, and white or loaded at its middle and base: in some of the more chronic cases, particularly when the disease is complicated with chronic disorder of the digestive mucous surface, it has what may be called a strawberry appearance, from the number of bright red dots scattered over it. This variety of the disease is often associated with torpor or imperfect function of the liver, with disease of the mucous surface of the stomach or bowels, or with both; and occasionally with bronchitis, especially during the period of dentition, when it often supervenes.

208. *b.* Another variety of this affection is also frequent in infants and children, and seems to be chiefly seated in the arachnoid. Dr. W. NICHOLLS has termed it sensitive erythsm of the brain. It is characterised by a morbidly increased sensibility, which distinguishes it from the foregoing variety. The child often cries without any obvious reason; is generally wakeful, lively, but irritable; all the senses, even that of touch, are morbidly acute, particularly the senses of sight and hearing: it frowns, winks its eyes, or closes them upon exposure to light; it sometimes shrieks, clenches its hands with the thumb bent across the palms, tosses backwards its head, and presents many of the symptoms of the preceding form of disease; and not infrequently terminates in effusion; but, more frequently than the foregoing, between the membranes exterior to the hemispheres.

209. *c.* The Treatment chiefly consists of leeching behind the ears or on the occiput; frequent scarifications of the gums; the affusion of cold water on the head, or cold sponging; calomel purges, followed by castor oil or other cathartics, and occasionally promoted by tebebinthinate enemata; frequent warm semicupia; the use of saline aperients combined with diuretics, and strict attention to diet and regimen, with change of air. After the several active calomel purges have been exhibited, and the evacuations have improved, and the more obvious symptoms are abated, small doses of hydrarg. cum creta may be given at night, either alone or combined with a little of the sub-carb. of soda or potash, and a

weak saline mixture through the day, similar to the following, or to F. 440. and 441.: —

No. 65. R. Magnesiæ Sulphatis (vel Sodæ Sulph.) ʒi; Potassæ Sulphatis ʒi; Aquæ Fœniculi ʒi; Spirit. Elher. Nit. Vini Antimonii Tart. Spirit. Juniper. Co. aa ʒi; Syrup. Scillæ ʒi. M. Capiat Infans ʒi—ʒiij. ter quaterve quotidie.

210. When the morbid sensibility or irritability continue notwithstanding the above treatment, and if the child be not very young, small doses of James's powder, and, if that fail of procuring quiet, of the pulv. ipecacuan. comp. may be conjoined with the hydr. cum creta, and given every night; or a little tinct. of hyoscyam., or of the extr. conii, may be added to the above mixture. In the soporose form of the affection, narcotics must be avoided, but the rest of the treatment strictly adhered to. Small doses of camphor and nitrate of potash may also be exhibited, — if in solution, with the spirit. æther. nit., and blisters applied either to the nape of the neck or behind the ears.

211. *E. Treatment of the sequela of encephalitis.* — After an attack of this disease, the patient may complain of vertigo, more or less torpor or weakness of the mental powers, cephalalgia, &c.; or of increased sensibility, and marked erythsm of the brain and whole nervous system, watchfulness, incapacity for mental exertion, tinnitus aurium, languor, and pain in the limbs, &c. In all such or similar cases, the diet should be carefully restricted to food of easy digestion, in moderate quantity, and consisting chiefly of the farinaceæ. Change of air, easy travelling, avoidance of all mental exertion and anxiety, and attention to the secreting and excreting functions of the abdominal viscera and of the skin, will generally bring about perfect recovery. If these fail; or if the patient have irregular flushings, or increased heat of head; or if the carotids pulsate more strongly than usual; the shower-bath, cold sponging the head night and morning, and wearing the hair closely cut, occasional local depletions, the insertion of a seton in the neck; or keeping out an eruption, in the same situation, with the tartarised antimonial ointment; or blisters kept open behind the ears for some time; may be prescribed.

212. When the more severe sequela of the disease are present, — such as cramps, pains, or spasms of the extremities, hebetude or derangement of the mental faculties, obstinate headach, &c., — we should suspect the existence of a chronic state of the disease, and resort to occasional local depletions, cold affusions, or sponging of the head; followed by issues in the scalp of the occiput, or the inunction of the tartar emetic ointment in this situation; and to the mercurial preparation at bed-time, with cooling and deobstruent aperients on the following morning; and to the other means above recommended. When we apprehend, from the marked character of the above symptoms, or from the paralysed state of particular muscles or parts, that organic lesion has been produced, the means now recommended should be strenuously persisted in; and the mercurial medicines may be pushed to slight salivation, under the favourable circumstances of pure air and mental quiet; after which, gentle tonics, and a more invigorating treatment and regimen, may be cautiously tried.

213. *F. The regimen during the disease should be strictly antiphlogistic. The patient's drink or beverage may consist of either of the formulæ,*

No. 590—595. 915. contained in the Appendix; and attention should be paid to the state of the urinary discharge; particularly to the prevention of accumulations of urine in the bladder, which ought to be removed by the catheter whenever any interruption of its evacuation occurs. The diet, and regimen generally, should be as carefully regulated during convalescence, as in the progress of the disease; and attention ought to be directed no less to the mental occupations, and moral emotions, than to the natural functions, and physical employments. Care should be taken not to carry abstinence too far in the meningitis or encephalitis of infants or children, particularly after large sanguineous depletions and doses of calomel have been employed. The exhaustion arising from too great abstinence, and from the treatment, will often simulate effusion into the ventricles; and be mistaken for it, if the history of the case be not carefully attended to in connection with existing symptoms.

214. BRAIN—SOFTENING OF THE.—*Ramollissement*. CLASSIF. CLASS. ORDER (Author, see Preface).—I have considered this change, apart from those proceeding from inflammation, although it is frequently a consequence of inflammatory action, occurring either in an acute, sub-acute, or chronic form, and characterised by deficient vital power; chiefly because I agree with M. ROSTAN, RECAMIER, and others, in considering that it occasionally is unconnected with inflammation, particularly in aged persons.

215. SYMPTOMS.—This disease takes place slowly, and we may distinguish in it two stages, the recognition of which is of much importance in the diagnosis, inasmuch as when the first period does not exist, or when the physician cannot obtain a satisfactory knowledge of it, it is difficult to determine the particular kind of disease present. 1st, *The first period*.—A. *Direct symptoms*, *a. of non-inflammatory softening*. A continued, and more or less severe, pain in the head is generally complained of. To some, the existence of pain may appear pathognomonic of inflammation; but, as M. ROSTAN has justly said, this is an inference not borne out by close observation; for pains frequently occur, of a most severe description, unconnected with any form of increased vascular action, or capillary injection. Cephalalgia is, however, not always present. At this period, vertigo is oftener complained of, and there is generally a more or less marked diminution of the intellectual and moral faculties. The perceptions, attention, judgment, memory, and imagination, are more or less enfeebled; and the patient sinks into a species of senile mental alienation. Sometimes the mental disturbance is partial or slight, owing to the seat and limited extent of the softening. There are observed, moreover, slowness in the answers; some degree of embarrassment in the motions of the tongue; dejection and sadness of spirits; hypochondriasis, or an extreme indifference as to events; great inclination to sleep, with prickings, twitchings, and numbness in the limbs; and much difficulty of laying hold of objects, particularly those of small size. The sensibility is generally diminished; vision is often affected, being less distinct than usual, or partially or altogether abolished. It very rarely happens, that unequal dilatation of the pupils, or strabismus, occurs. The sense of

hearing is generally impaired. These are the chief symptoms of *non-inflammatory softening* of the brain.

216. *b. If the softening proceeds from inflammatory action*, this period is more acute, of longer duration, and presents also certain important distinctions. The pain in the head is then more acute and sharp; the answers are abrupt and quick, and there is frequently delirium: the sensibility of the limbs is often increased, and the patient complains of pain in them, with stiffness, contractions, and cramps. This affection of the limbs may be mistaken for rheumatism, but is to be distinguished from it by the existence of cerebral symptoms, and the absence of increased heat, redness, or tumefaction. The senses evince excessive sensibility, and cannot tolerate their natural stimuli. (ROSTAN.)

217. *B. Indirect symptoms*.—*a. The functions of organic life do not present undeviating symptoms, and assist but little the diagnosis; the appetite may be diminished, the thirst somewhat increased, and digestion more or less disturbed, and the mouth and tongue white and clammy. Sometimes there is nausea, or even vomiting, with epigastric tenderness; and there may be either constipation or slight diarrhoea; micturition is more or less difficult, or involuntary; or all these symptoms may be absent. The following are more constant in this non-inflammatory form of the disease: the pulse is slower and feebler than natural, a symptom which is not observed in inflammatory softening of the brain; the skin is pale, its temperature is lower than natural, and the respiration slow and gentle.* *b. In inflammatory softening*, the pulse is strong, full, or frequent; skin hot; and there is much thirst, with many of the symptoms described in the section on *Cerebritis* (§ 164.), but generally in a sub-acute or chronic and slight form. Thus far, the symptoms do not seem very urgent; and they may be so slight, or so obscure, that the patient is not induced to have recourse to medical aid, or the physician overlooks the nature of his ailments.

218. 2d, *Second period*.—A. *Direct symptoms*. *a. The patient now loses the use of some limb, or even one half of the body, either gradually or suddenly, but generally the latter. The greater part of the time his intelligence is but little disturbed, but he answers with extreme slowness, and is often incapable of making himself understood, excepting by the aid of painful gesticulation. In certain cases, either complete coma supervenes on the paralysis, or both come on simultaneously. If the latter, the patient often regains his recollection in a day or two afterwards. This change seems attributable to temporary congestion of the brain. The symptoms, particularly the coma and paralysis, are increased, the mental faculties and the powers of sense become entirely abolished, and the patient sinks under the most complete coma.* (ROSTAN.)

219. *b. In the inflammatory softening*, in the place of paralysis, there exist pains, more or less violent, shootings in the limbs, with contractions, cramps, or convulsions, and severe headach. In either the inflammatory or non-inflammatory form of the disease, when the patient complains of pain in the head, and is asked its situation, he carries the unaffected hand slowly to his head, and indicates generally the side opposite to that

paralysed. In *encephalitis*, there is generally delirium; in the *non-inflammatory* form of *softening*, the intellectual faculties are enfeebled, or much weakened; the countenance is generally pale, colourless, or sometimes even sunk; whereas in *inflammatory softening* it is red, or more or less injected, or even tumid.

220. *B. Indirect symptoms.*—*a.* In this second stage of the disease, the organic functions are more or less affected: there is no appetite; the teeth and gums are dry, the tongue rough, brown, blackish, chopped or traversed by small fissures: deglutition is difficult: sometimes there is vomiting, first of the ingesta, and afterwards of bile: all the excretions are involuntary; frequently there is constipation: respiration is laboured, and at last stertorous; the pulse feeble, frequently irregular or unequal, or even intermittent, and the skin is cold. *b.* In *inflammatory softening* there is great thirst, redness of the tongue, sensibility of the epigastrium and abdomen, hot skin, a strong and frequent pulse, &c. (See § 170.)

221. The second period may be of longer or shorter duration. The morbid phenomena often continue stationary for a considerable period, and then make rapid progress; at other times the progress is slight, but constant; in some cases it is constant and remarkable. This disease very rarely retrogrades or evinces much amelioration; its progress is essentially continued and increasing. The anatomical characters of softening have been already fully described (§ 70, *et seq.*). It may be stated in general, that when it is the result of inflammatory action, as it most frequently is, 1st, The colour of the softened part is, more or less, deeper than natural, or of a rose tint; 2d, It contained a certain quantity of pus, sometimes infiltrated through the softened tissue; and, 3d, Febrile symptoms have existed previously to the death of the patient.

222. *TREATMENT.*—It is unnecessary to add any thing to what has been already advanced respecting the treatment of the inflammatory states of softening, which are essentially the consequence of partial cerebritis (see § 191, *et seq.*). When, however, the disease does not present an inflammatory character, it becomes necessary not only to enjoin abstinence from all debilitating means, but from the commencement to apply rubefacients to throw irritants into the great intestines (see *Enem. F.* 141. 150.), and to have recourse to tonics, aromatics, &c., of which the sulphates of zinc, iron, or quinine, in small doses, with sulphuric acid, or the less heating astringent tonics belonging to the vegetable kingdom, are the most eligible; preserving, at the same time, a regular state of the alvine secretions and evacuations, and of the other digestive functions.

223. *Regimen.*—The gently tonic, chalybeate, and aperient mineral waters are of service in the non-inflammatory form of the disease; whilst those only which are aperient and deobstruent should be ventured upon in its inflammatory states, when they may be tried and varied; local evacuations, revulsives, particularly setons, issues, &c., being kept discharging at the same time. In both forms of the disease, gentle travelling, and change of air, and agreeable and quiet amusement, without undue mental excitement of any kind, will be of much service. M. ROSTAN'S injunctions under this head may be summed up as

follows:—Those alimentary and medicinal substances which exert a strong and speedy action on the encephalon, should be strictly shunned. Wine, spirits, coffee, and spices, are of this number. Excess at the table is dangerous. The diet should be mild and moderate, and the food easy of digestion, but not too nutritious. The impression of cold air on the head may be favourable: sudden passage into a heated place must be avoided: the patient should inhabit a cool situation. Whatever, by compressing the limbs or the organs contained in cavities, may favour cerebral congestion, must be rigidly proscribed. Warm, as well as cold bathing should be interdicted: tepid bathing alone may be permitted, although with much caution. Cold lotions to the head are advantageous in the inflammatory form of the disease, provided we do not permit reaction to be established; at the same time pediluvia containing mustard may be prescribed. The ordinary excretions should be kept up; but sexual indulgence, too violent exercise, strong emotions, long study, and watching, should be carefully avoided. The age, strength, constitution, habits, and state of the patient, and the character of the symptoms, must modify these precepts.

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BRONCHII, DISEASES OF THE. SYN. *Βρόγχος*, Gr. *Bronchus*, *Bronchia*, Lat. *Bronche*, Fr. *Die Luftröhrenäste*, Ger. *Bronchi*, Ital. *Air-passages*, *Air-tubes*, Eng.

1. BRONCHI AND AIR-TUBES — *their Alterations*. Under this head, the alterations of structure usually found in the air-tubes, from the larynx to the smallest subdivisions of the bronchi will be first considered, and subsequently the history of such of them as are more immediately seated in the bronchi, and are not treated under distinct heads, where some of them are placed, owing to their specific nature, and their relations to other parts.

2. I. ALTERATIONS OF STRUCTURE IN THE BRONCHI. — As the same lesions are found in the larynx and trachea, as in the bronchi, although certain of them are more frequent in one part than in another, no particular distinction depending on locality merely will be made, in order that repetitions may be avoided.

3. I. ALTERATIONS OF THE MUCOUS MEMBRANE OF THE AIR-PASSAGES. — These are the same in kind from the glottis to the air-cells, whether the vascularity, the structure, or the secretions of this membrane, be individually or collectively changed. *A. Passive or simple congestion* of this surface is not unfrequently found after death; and there is every reason to believe that it may take place during life, or at the moment of death, or even be a *post mortem* change. When occurring during life, it is most frequently met with in the debilitated, and when the return of blood to the left side of the heart has been impeded. Simple congestion of this membrane may be either partial or general. When *general*, and at the same time suddenly and intensely formed, it may terminate life with all the symptoms of asphyxy. (See CONGESTION OF THE BRONCHI.) In a slighter form it accompanies various diseases, particularly the febrile exanthemata; but it is seldom found in a chronic form. Congestion of this membrane presents various depths of shade, varying from a dirty pale red, or a brick red, to a brownish or purplish hue; being sometimes equally deep throughout, in others of a different shade in different situ-

or affects one part of the air-passages more than another. It is also of a livelier colour, and is usually attended with some of the changes hereafter to be noticed. Partial or inflammatory redness of the mucous membrane is very much more common than general congestion. It may be limited to the trachea and larynx, whilst the bronchi are pale; and in this case it may be confined to one side of the tube. M. ANDRAL has seen it cease abruptly at the medium line, particularly when one lung was affected; and then the inflamed side of the trachea has corresponded with the diseased lung. The redness may also be confined to the large bronchi, the mucous surface of the passages above and below its seat being pale; or it may be limited to the smaller bronchi, where it often occasions great dyspnoea and fever, with little or no cough. According to M. BROUSSAIS, the bronchi of the upper lobes are most frequently congested and inflamed. Congestion and inflammatory injection of the bronchial mucous membrane, although very often connected with diseases of the substance of the lungs, are not necessarily dependent on any of them; for this membrane may be pale from the glottis downwards in cases of acute, and still more in chronic, pneumonia. The same obtains in respect of tubercles, previously to their softening. In many cases, however, where tubercles exist in the lungs, the surface of the smaller bronchi are more or less inflamed or congested; and when the tubercles have advanced to softening, the bronchi nearest them are almost always red. Where tubercular excavations exist, the redness is still more marked and extensive, sometimes proceeding along the trachea to the larynx: bronchitis thus supervening to tubercular phthisis. In these and various other diseases, the inflammatory state of the mucous surface commences in the smaller ramifications, and spreads upwards to the glottis. But in other maladies, particularly those which first affect the Schneiderian membrane, throat, fauces, pharynx, &c., the injection of the bronchial surface is chiefly an extension of these; inflammatory action more frequently originating in some one of these situations, and extending itself more or less rapidly, according to the state of the patient, along the surface of the larynx, trachea, and large bronchi successively, until it at last reaches the minute bronchi, or even the air-cells and structure of the lungs. This is the usual direction in which inflammation of the mucous membrane of the air-passages commences and extends itself; but most frequently without reaching the smaller bronchial ramifications, and pulmonary parenchyma.

5. C. *Thickening of the mucous membrane of the air-passages* is a very common lesion, arising, 1st, from its congested or injected state; and, 2d, from its increased nutrition or hypertrophy. *a.* The former is most frequently observed in the larynx and small bronchi: it is sometimes found in children about the margin of the glottis, giving rise to a form of croup. *b.* True thickening, or hypertrophy of this membrane, occurs in various situations, occasioning very different phenomena accordingly, particularly in those who had been affected with chronic coughs. This form of thickening may extend throughout the larynx, or may be limited to the epiglottis, to the entrance of the glottis, to the chordæ vocales, or to the ventricles.

4. B. *Inflammatory injection*, or active congestion of the bronchial surface is generally partial,

In the trachea it may occasion no marked symptom; but in the bronchi, particularly the smaller, it gives rise to sensible alterations of the sound of the pulmonary expansion. It may, when extensive, very materially impede the changes produced by respiration on the blood. Hypertrophy of this membrane may also be confined to a circumscribed point, forming thus a tumour rising above the surrounding surface. This form of thickening may assume a nearly cauliflower appearance, from its exuberance. These excrescences have been found in the larynx by MM. ANDRAL and FERRUS.

6. The *mucous follicles* may be enlarged independently of the membrane in which they are seated. When this is the case, a number of round granular bodies, of either a white, red, or dark brown colour, are found on the internal surface of the membrane, surrounded by two coloured circles—one round the centre, the other round the base. M. ANDRAL thinks that they have often been mistaken for tubercles, and for the variculous eruption.

7. *C. Other alterations of structure in the respiratory mucous membrane.*—*a. Atrophy* is said by ANDRAL sometimes to be observed in this membrane. *b. Softening* is much more frequent; and is most common in the larynx, especially in the situation of the chordæ vocales and ventricles, where it is sometimes very remarkable, and has been the only change of these parts observed in persons who had either lost their voice or been hoarse long before death. *c. Ulceration* is not infrequently found in this membrane. Ulcers may be seated in any part of the air-passages, but are more common in the larynx than in the trachea or bronchi. They rarely, however, occur in the larynx, without tubercular ulceration existing also in the substance of the lungs. They occasion various modifications of the voice, according to the parts of the larynx in which they are situated; being found in every point of its internal surface. Their size and number vary exceedingly. Sometimes only one very small ulcer is found, the rest of the larynx being in all other respects quite natural. In other cases, this part is nearly destroyed by numerous ulcers of various shapes and sizes; and in some cases, one large ulcer extends over one half or more of the larynx. Ulcers, when seated in the trachea, are chiefly found in its posterior or membranous part. M. ANDRAL states, that in some cases they are confined to one side of the trachea, which invariably corresponds to the diseased lung; or, if both lungs be diseased, to that which is most affected. Ulcers are not so frequent in the bronchi as in the larynx, but more so than in the trachea.

8. Ulcers in the internal surface of the air-passages sometimes extend no deeper than the cellular tissue connecting the mucous membrane to the subjacent parts. In this case the connecting tissue is much thickened at the bottom of the ulcer. But they frequently proceed deeper, destroying successively the different tissues, until the parietes of the tube are at last perforated, and a fistulous opening is formed between it and some neighbouring organ or part, as the œsophagus, aorta, parenchyma of the lungs, large blood-vessels, the pleural cavity, &c., or even the external surface; forming, in this last case, a direct communication between its interior and the external air. When a fistulous opening extends

into an excavation in the parenchyma of the lungs, it is difficult to determine whether it produced, or was itself occasioned by, the excavation. When it is connected with a cavity arising from the liquefaction of tubercular masses, there can seldom be much difficulty in determining the precedence, but every cavity found in the lungs has not this origin. There can be no doubt that ulcers perforating a bronchial tube may excite inflammation of the substance of the lungs, and occasion either small abscesses, or ulcerations, which enlarge into considerable excavations. But, in the majority of cases, excavations communicating with the bronchi arise from the softening of tubercles; the bronchi being perforated from without inwards, instead of from within outwards, as in the case of ulceration commencing in their mucous surface. The bronchi or trachea may be also perforated from without inwards, by aneurisms, &c. of the aorta, and not infrequently by ulceration commencing in the œsophagus and extending through the membranous part of the trachea; an instance of which I lately had an opportunity of seeing in a patient of my friend, Mr. LYAM. Suppurated bronchial glands may also perforate the bronchi which they surround, and pour their contents into them. A similar result may likewise occur from purulent collections, hydatid formations, &c. of adjoining parts, as of the thyroid gland; instances of which are recorded by PORTAL and ANDRAL.

9. *D. Alterations of the secretions of the air-tubes.*—M. ANDRAL has very justly stated that alterations may occur, 1st, in the gaseous secretion; 2d, in the perspiratory exhalation; and, 3d, in the mucous secretion. *a. Changes of the gaseous exhalations* are but little understood, and are more matters of inference than of demonstration. There can be no doubt, however, that not only in various diseases, but also in certain states of the system and of the atmosphere, a very material alteration occurs in the proportions of the different gases naturally exhaled by the mucous surface of the lungs. That the successive changes in the system, certain conditions of temperature and of the air, different states of vital energy, and the constitutional differences in the various races of our species, modify very materially the quantity of carbonic acid gas and of azote exhaled from the lungs, may be considered amongst the surest established facts in physiology. (See my *Notes*, &c. p. 626.) Such being the case, it may reasonably be inferred that marked alterations of the gaseous exhalations also take place in disease.

10. *b. The perspiratory exhalations* evidently undergo changes in disease; but their nature and extent are but little known. The vapour exhaled from the respiratory mucous surface very probably may, when excessive, be condensed into a liquid state, and increase the watery fluid sometimes discharged from the lungs. M. ALIBERT states that he has seen, in certain diseases of the skin which the cutaneous transpiration is suppressed, the pulmonary vapour issuing like steam from the chest, and descending again like an abundant dew. M. ANDRAL adduces, in his *Clinique Médicale*, the case of a person who suddenly discharged, whilst suffering from hydrothorax, an enormous quantity of a serous fluid from the bronchi, at the same time that the fluid which had been effused in the chest was absorbed.

11. *c. Alterations of the mucous secretion* of the bronchi have been successfully studied by a number of modern pathologists, but more particularly by M. ANDRAL. This secretion is modified both in its quantity and quality. It is often very greatly increased in acute and chronic affections, particularly those immediately affecting the respiratory passages; under which heads the principal changes of this secretion, with the different states and stages of disease, are described. The quantity of the mucous secretion may be so excessive as to nearly fill up the bronchi, trachea, and larynx, and to suffocate the patient. This sometimes occurs in adults; but, I believe, still more frequently in children, forming in one of its states a species of croup intermediate between true croup and bronchitis; and, in another state, the disease hereafter described as *asthenic bronchitis*. M. BLAUD considers the former, or that seated chiefly in the large bronchi, in which the secretion is consistent and glairy, a "form of croup, and calls it *croup myxogène*." This excessive secretion of mucus is sometimes unattended by any alteration of the air-passages. The mucous secretion may become so viscid as to adhere to the sides of the bronchi; where it may accumulate so as to occasion a fatal dyspnoea, by preventing the passage of the air. In other cases, the mucus is transformed into a puriform fluid; sometimes without any trace of ulceration, or even of redness, in any of the bronchi; the alteration of the secretion being independent of any perceptible change of structure. More commonly, however, patches, streaks, or points of inflammatory injection of the mucous membrane accompany this state of secretion.

12. *d. Membraniform concretions, or false membranes*, form more frequently upon the internal surface of the air-passages than in any other mucous canal. Some pathologists have supposed them to be consequent on the most intense states of inflammatory action in mucous membranes; but this is evidently not the case: they are rather a result of a certain state of the system, probably connected with excess of the albuminous constituent in the blood, together with a disposition in the inflamed vessels to secrete it. (See art. CROUP.) These membranes are generally unorganised, and vary in thickness and consistence in different parts as well as in different cases. According to SCHWITOUZ, they consist of albumen, with a small portion of carbonate of soda and sulphate of lime. M. BERTONNEAU has detected fibrine in them. They may exist in patches, or in continuous layers, or in perfect tubes; and extend from the larynx, where they usually commence, to the minute divisions of the bronchi. They rarely originate in this latter situation, and advance upwards; but they often commence in the pharynx, fauces, &c., and extend through the glottis, and down the trachea and bronchi. They are most frequently met with in children from two years of age to puberty; and are not confined to, although most frequent in, acute diseases. In some cases they assume, in children, a chronic character, but only when confined to the trachea; whilst a chronic state is most common in adults, when they are usually formed in the bronchi. When, however, they occur in the larynx, the tumefaction of the subjacent membrane, the spasms of the muscles, and their own

thickness, often give rise to an acute or fatal disease. When seated in many of the small bronchi, they may occasion asphyxy by interrupting the changes produced by the air on the blood. It is probable that *fibrinous* or *polypous* concretions may sometimes form in the bronchi, from the coagulation of a portion of blood exhaled from its mucous surface. LAENNEC has described (*Rév. Méd.* 1824, t. i. p. 384.) a case which appears to be of this description. Such formations differ from the albuminous exudations, in their containing much fibrine, and being of a darker colour than the latter.

13. *e. Earthy or calcareous concretions* occasionally are found in the air-passages, and are sometimes coughed up. They consist chiefly of phosphate of lime; and are formed either in the substance of the lungs, and escape into the bronchi, or in the latter; but more probably in the air-cells. They have also been found impacted in the ventricles of the larynx. The cause of their formation is not well understood. They have been ascribed to chronic irritation of the small bronchi and air-cells; but this source is by no means well established. I have met with them in gouty persons, by whom "particularly they are often expectorated during life, recovery generally taking place. *Hydatids* have also been found in the air-tubes. In some cases they may have been developed in this situation; but they much oftener escape into it from contiguous parts.

14. *f. Haemorrhage from the respiratory surfaces* are amongst the most frequent changes to which it is subject. In the greatest number of cases of *hæmoptysis*, the blood is exuded without any ulceration or breach of surface: a slight redness of the mucous membrane being the only change that can be detected. When the hæmorrhage occurs in the smaller bronchi, the blood sometimes accumulates and coagulates in them; imparting a blackish or brownish black appearance to the lobules, and constituting the *pulmonary apoplexy* of LAENNEC. The occurrence of hæmorrhage into the parenchyma of the lungs is, however, more strictly deserving of this appellation. The extravasation and coagulation of blood in the small bronchi, giving to portions of the lung a blackish and indurated appearance, are most commonly, but not always, found in persons who have expectorated blood, or died from an attack of hæmoptysis; and are most frequent in those cases which supervene in the progress of diseases of the heart. M. ANDRAL considers, however, that the hæmoptysis is not from those sources which have been called apoplectic; but from a larger extent of mucous surface, and from larger tubes. (See art. LUNGS — Alterations of, and Haemorrhage from.)

15. ii. ALTERATIONS OF THE OTHER STRUCTURES COMPOSING THE AIR-TUBES. — *A. The fibrous and muscular tissues* of the air-passages experience various changes. *a. The fibrous structure* of the bronchi are sometimes found either softened or hypertrophied. The thyro-arytenoid ligament is occasionally softened. It has then lost its brilliant colour, become opaque, or even changed into a cellular-like tissue, or an unorganised pulpy substance, leaving the thyro-arytenoid muscle exposed. In this case the voice is remarkably altered. When the fibrous tissue is hypertrophied, increase of thickness is the chief appearance. (ANDRAL.) *b. The muscular structure*, as it exists in the trachea, &c., may be either atrophied

or hypertrophied; it may also be softened and destroyed partially or in points by ulceration (§ 7, 8.). But it is chiefly where this structure assumes a different state and function, as in the larynx, that it undergoes marked alterations, giving rise to the most formidable and fatal diseases. The muscles of the larynx are, in some of those cases, softened, more or less atrophied, or even altogether destroyed; and, in others, infiltrated with either purulent or tubercular matter. (BOUILLAUD, ANDRAL, and others.) M. ANDRAL states, that he has more than once observed, on examining the larynx of persons who had been long completely without voice, the thyro-arytenoid muscle either remarkably atrophied, or its fibres infiltrated by different morbid secretions; this being the only lesion that could be detected.

16. *B. The cartilaginous structures of the air-passages* are most frequently diseased in the larynx. The cartilage of the epiglottis sometimes loses its natural form: it is scarcely ever ossified; but it is occasionally somewhat indurated, so that it imperfectly protects the opening of the larynx. It is not infrequently destroyed altogether by ulceration, commencing either in itself, or in the tissues enveloping it. Similar changes to these sometimes take place in the other cartilages of the larynx. Ulceration of these cartilages may be superficial only; or it may destroy more or less of their structure. It generally commences in the soft parts covering them; but in some cases, particularly of constitutional taint, there is reason to suppose that it originates in inflammation of the cartilages themselves, terminating in the ulcerative process, and the formation of purulent matter in the soft parts adjoining, which escapes by a fistulous opening, generally through the mucous surface into the larynx, and rarely externally. Ulceration may also commence in the articulations of the cartilages; filling them with pus, and destroying their ligaments and articulating surfaces. The thyroid and cricoid cartilages are naturally ossified in old age; and in consequence of disease, in earlier life. M. ANDRAL states, that the arytenoid cartilages have never been ossified. The rings of the trachea are sometimes ossified, but seldom or ever otherwise altered. The cartilages of the bronchi are often hypertrophied, becoming more apparent, and forming more complete rings, than natural. They are also sometimes ossified. MM. REYNAUD and ANDRAL found the ultimate ramifications of the bronchi changed into osseous spiculæ, with minute canals (the cavities of the bronchi) running through them, in very old subjects. M. ANDRAL states, that the bronchial cartilages may become so brittle from disease, as to break into fragments, project into the canal of the bronchi, or become altogether detached, and be ultimately expectorated.

17. *C. The cellular tissue* connecting the above structures is often the seat of disease. In the larynx, it is very frequently the seat of inflammation and congestion; and, in consequence of a chronic state of inflammatory action, it sometimes becomes indurated and thickened; diminishing remarkably the calibre of the glottis, impeding the action of the muscles, and affecting the form and movements of the epiglottis. This tissue, in the situation of the larynx and epiglottis, is occasionally infiltrated with serum, which, when considerable, constitutes the *œdema of the glottis*,

first accurately described by BAYLE. The infiltration may distend the folds of mucous membrane, surrounding the rima of the glottis, so as to obstruct more or less the passage through it. This change is generally consecutive of inflammation of the mucous membrane of the larynx, or of chronic affections of this organ. In some cases it is very chronic; in others very acute, quickly producing asphyxy. Instances of this latter form are to be found in the sixth volume of the *Archives Générales de Médecine*, and twenty-second volume of the *London Medical Repository*. Purulent matter is sometimes found in the cellular tissue of the air-vessels, either in the state of small abscesses, or infiltrating it to a greater or less extent; and either in the ventricles of the larynx, or in any other situation in the course of the air-passages. Tubercular matter has also been found in various parts of this tissue. Different kinds of tumours occasionally compress the nerves supplying the air-vessels, and give rise to symptoms similar to those caused by disease of their parietes. They are sometimes formed in the larynx, or in its immediate vicinity, occasioning more or less complete occlusion of the glottis. M. FERRUS has recorded a case where this result followed the development of two fungous tumours in the larynx (*Archives Génér.* Août 1824.). Several writers have made mention of a *varicose state* of the veins of the air-passages amongst the causes of hæmoptysis; but M. ANDRAL states that he has never met with this appearance in his numerous post mortem inspections.

18. *iii. ALTERATIONS OF THE SIZE OR CALIBRE OF THE AIR-VESSELS.*—The changes already described very often cause marked change in the air-tubes, either diminishing or increasing their calibre. *A. Diminution of their canals* are occasioned, *a.* by the formation of false membranes, chiefly in the larynx and trachea of children, and in the bronchi of adults: *b.* by thickening of the mucous membrane; occurring principally in the glottis and bronchi: *c.* by infiltrations of fluids into the sub-mucous cellular tissue, chiefly in the larynx and vicinity: *d.* by various substances formed in some part of these tubes, such as hydatids, coagula of blood, concrete mucus, &c.: *e.* by compression by some tumour situated externally to some portion of them, as by the thyroid gland, an aneurismal tumour, or enlarged bronchial glands. *f.* Lastly, there is every reason to conclude, that diminution or constriction of some part of these passages very often arises, although seldom in so permanent a manner as to be observed after death, from spastic contraction of the fibres or muscles belonging to them; particularly when foreign bodies escape into the trachea, or when it, the larynx, and even the bronchi, are irritated by morbid productions—the larynx more especially.

19. *B. Dilatation of the bronchi* was first described by LÆTREC, and afterwards illustrated by ANDRAL and others. It is most frequently observed in the smaller ramifications; and may be so great as to be mistaken for tuberculous excavations. *a.* In some cases, the bronchi may be uniformly dilated throughout one or more of their ramifications, some of those which could not naturally receive a fine probe, having attained the size of a goose-quill; and, in some instances, even admitting the finger. These dilated branches are

sometimes visible on the surface of the lung, where they terminate abruptly. They occasionally also terminate, particularly near the top of the lung, in an indurated black portion of its substance, or in a cartilaginous mass, or in a calcareous concretion, either exterior or interior to the dilated bronchi. *b.* In other cases, the dilatation is limited to a particular point of the tube, and has the appearance of an excavated cavity in the substance of the lung, for which it may be mistaken, especially when it is met with in the upper lobe. The size of cavities arising from this species of dilatation varies from that of a hemp-seed to that of an egg. Several of these may co-exist. When they are placed near each other, they form, by their communication, a complicated sinus filled with puriform mucus, and closely resemble some kinds of tuberculous excavations. *c.* Occasionally they present a third form, consisting of a succession of dilatations, between each of which the bronchus recovers its natural diameter, the walls of the dilated portion being generally thin and transparent. One lung may contain a number of these dilatations. *d.* The *parietes* of the dilated bronchi are, in some cases, hypertrophied, or more fully developed than in the natural state; in other cases they are reduced to a delicate membrane, presenting neither fibrous nor cartilaginous tissue. (ANDRAL.) The dilated portions generally contain much mucus, or a puriform mucus.

20. These changes of the bronchi are seldom found, unless in persons who had suffered attacks of chronic bronchitis. They are most common in persons of middle or advanced age. But they are also sometimes met with in children who had died of whooping-cough, particularly in its more chronic states, and when complicated with bronchitis. I have occasionally found them in this class of subjects; but only consequent upon this disease. Dilatations of the bronchi, unless when very considerable, seldom occasion any change of the parenchyma of the lungs, beyond compressing and condensing it: they are frequently associated with either grey or dark induration of the adjoining pulmonary substance. (See CHRONIC BRONCHITIS, § 52, 61.)

II. CONGESTION OF THE BRONCHI. CLASSIF.

I. CLASS, III. ORDER (Author).

21. DEFIN. *Urgent continued dyspnoea; little or no cough, and no expectoration; with an anxious, pale, or livid countenance.* — This affection is not often seen in a primary, severe, and general form; but it is very common in more slight and partial states; and as an attendant on typhoid, malignant, and pestilential diseases, and on exanthematous fevers, especially measles, scarlatina, and small pox, either shortly before the breaking out, or upon the premature disappearance of the eruption, when it often assumes a very general and severe form: and it is not infrequently, in slighter grades, ushers in other diseases of the bronchi, particularly hæmorrhage, bronchitis, humoral asthma, &c. General idiopathic congestion of the bronchi, to such an extent and degree as to destroy life, although rare, is sometimes met with. Several cases have been recorded of persons who, without any apparent cause, were seized with urgent dyspnoea, increasing until it terminated in death; and, on dissection, the only morbid appearance observed, was general congestion of

blood in the capillary vessels of the mucous and sub-mucous respiratory tissues. (See § 3. for a description of its anatomical characters.)

22. The symptoms of this affection have not been sufficiently investigated; but they may be stated to consist of continued dyspnoea, more or less urgent; sometimes fever, little or no cough, and no expectoration; the sibilous or sonorous rhonchus in the large tubes, and absence of the respiratory murmur over the chest; diminished resonance on percussion; anxious, pale, bloated, or slightly livid countenance; purplish tint of the lips and nails of the fingers; anhelation, &c. When the congestion takes place in the course of fibrile or exanthematous diseases, in addition to these, the pulse becomes very quick, small, irregular, or intermittent, and the oppression at the chest extreme.

23. The causes of these congestions are not well known. They appear, however, to be most frequently occasioned by the inhalation of poisonous gases or effluvia; by close, overheated, and crowded apartments; by the ingestion of sedative or narcotic substances, or indigestible or poisonous animal or vegetable matters; by inordinate distension or oppletion of the stomach; and by the transition or metastasis of other diseases, or by their determination to the bronchial surface in a more especial manner, as in the instances above referred to (§ 21.). When this affection proceeds from poisonous or indigestible substances, and not infrequently also when it arises from other causes, it is evidently associated with more or less congestion of the substance of the lungs. It often precedes other pulmonary complaints, as hæmorrhage, and that modification of asthma, called dry catarrh by LAENNEC. Congestion of the bronchi sometimes also occurs in the progress of several diseases of the heart attended with obstructed or impeded circulation through its cavities, particularly those of its left side; and is often one of those changes which supervene in the advanced stages of several acute diseases, especially the exanthemata, and to which death is more immediately owing. (See § 21.)

24. The TREATMENT must depend upon the state of the vital energies at the time, upon the nature of the causes to which the congestion is owing, and on the evidence of existing general plethora. The state of the pulse, in respect of frequency and fullness, will indicate the degree of activity characterising the attack; but generally, when the congestion is considerable, the changes which take place in the lungs during respiration being impeded, the vital energies become proportionately reduced, and the pulse weak, quick, and small. In the majority of cases, it will be necessary, notwithstanding, to abstract blood either by venæsection or cupping; and if the depression of vital power be urgent, to exhibit simultaneously stimulants by the mouth, and in enemata; to employ frictions with irritating liniments (see F. 305. 308. 311.), and revulsants, such as sinapisms, blisters, mustard pediluvia, &c.; and to inhale, at brief intervals, and for a very short time, stimulating vapours, particularly those of ammonia, camphor, aromatic vinegar, &c., with the view of exciting the nerves of the bronchi, and thereby removing the distension of the capillaries, and accelerating the circulation through them. When,

however, the patient, in addition to the symptoms, indicating congestion, complains of a sense of heat, trickling, &c. in the course of the trachea, or under the sternum; and if the pulse retains its volume, and still more especially if it be sharp, full, or rebounding; we should infer that the fullness of the bronchial vessels is of an active description and most probably amounts to determination of blood; and, possibly, constitutes the early stage of hæmorrhage or of inflammation. In cases of this description, full blood-letting, either generally or locally, or both; and afterwards, counter-irritation and revulsion, irritating cathartic injections, the strict avoidance of internal stimuli, and the antiphlogistic regimen; must be prescribed.

25. In every case a strict reference should be had to the cause, associated circumstances, and the complications of the attack, and the treatment should be varied accordingly. When it seems to have been induced, or aggravated, by hurtful substances taken into the stomach, the exhibition of emetics, particularly No. 402. in the Appendix, ought not to be omitted; and, if they fail of operating, the stomach-pump should be used. The bronchial congestion preceding, accompanying or consequent on the eruptive fevers, is to be combated by cupping, revulsants, rubefacients, stimulating frictions of the surface, and by emetics.

III. HÆMORRHAGE FROM THE BRONCHI. — *Hæmoptysis* (from *haima*, blood, and *πύσις*, sputum) frequently occurs, and often consists, as already stated (§ 14.), of a simple exhalation from the mucous surface. It is seldom, however, owing merely to the pathological state of the bronchi; but is either connected with some change in the substance of the lungs, or with impeded circulation through the heart; although the bronchial surface is generally its more immediate source. Being, therefore, intimately related to various changes of the lungs themselves, and often occurring in consequence of these changes, it will be considered in connection with them. (See LUNGS — Hæmorrhage from, &c.)

IV. BRONCHI, INFLAMMATION OF THE. SYN. *Bronchitis*, Badham, Hastings. *Erysipelas Pulmonis*, Lommius. *Catarrhus pituitosus, Angina bronchialis*, Stoll. *Catarrhus suffocatus*, Auct. Var. *Bronchitis Catarrhus*, Hildenbrand. *Peripneumonia Bronchitis*, J. Frank. *Bronchite*, Fr. *Die Entzündung der Luftröhrenäste, Bronchialentzündung*, Ger.

CLASSIF. 3. Class, Diseases of the Sanguineous Function; 2. Order, Inflammations (Good). III. CLASS, I. ORDER (Author, see Preface).

26. DEFIN. Cough with, or without rigors, often preceded by coryza, and followed by expectoration of a transparent, pale, glairy, and watery fluid; more or less febrile commotion, dyspnoea, and slight soreness, heat, or tightness of the chest, which are diminished as the expectoration becomes more abundant and opaque.

27. This important disease, until Dr. BADHAM directed particular attention to it, was, according to the particular form it assumed, confounded with common catarrh, with pneumonia, under the appellation of peripneumonia notha, and with other diseases of the lungs and air-passages, more especially tubercular consumption, dyspnoea, &c. Dr. YOUNG seems to have viewed it as a modifi-

cation or extension of inflammation of the trachea, or even as synonymous with that disease, probably from their occasional complication, or succession to each other. J. P. FRANK appears to have been among the first who directed attention to the frequency and importance of inflammation of the bronchial surface. "Cum vero," he observes, "profundius per tracheam penetrat, ac in bronchia descendit inflammatio; tunc in primo casu tracheitidis speciem, in altero peripneumoniæ imaginem refert, in qua ultima vix non constantem internorum bronchiorum phlogosin in centenis cadaveribus deteximus." (*Interp. Clin.* p. 110.) "Rectam habebis febrium catarrhalium saltem fortorem ideam, si eas pro inflammatione bronchiorum, sive pro bronchitide consideres." (*De Cur. Hom. Morb.* p. i. t. i. c. vi.) BROUSSAIS also noticed the frequency and importance of inflammation of the mucous surface of the bronchi (*Hist. des Phlegmas. Chron.* t. i. p. 75. Paris, 1800.). But it is chiefly to the writings of BADHAM, BROUSSAIS, HASTINGS, LAMENEC, VILLERMÉ, ALCOCK, ANDRAL, and CHOMEL, that we are indebted for our knowledge of it as a specific disease.

28. Bronchitis commences variously, and assumes different forms and states, according to the intensity of the exciting causes, the severity of the attack, and the constitution of the patient. I shall consider it chiefly with reference to its activity and duration, to the states of vital energy and age of the patient, to its forms and complications, and to its results. Its general prevalence, severity, and not infrequent fatality, require for it a more particular notice than it has received, even recently, from several systematic writers. This will appear somewhat singular, when I state that I know of no disease that is more frequent, or productive of a greater number of deaths, in children, than it, in its different states and complications.

29. i. ACUTE BRONCHITIS assumes different grades of severity, and a modified type, according to the habit of body and vital energy of the patient, and the extent to which the inflammatory action advances along the bronchial tubes. It presents itself in practice, as a primary disease, in three forms: — 1st, Common catarrhal bronchitis, in which only the mucous membrane of the large bronchi and trachea are affected by the specific and often infectious inflammatory irritation constituting catarrh: 2d, Sthenic or true bronchitis, in which the inflammatory action is more acutely marked — is of a more phlogistic description, probably from its further extension along the bronchi, and from both the mucous and the sub-mucous tissue of the tubes being affected: and, 3d, Asthenic bronchitis, where, owing to weak vital energy, the inflammatory irritation assumes a lower and more asthenic grade, and extends still more generally, or affects especially the minute bronchi, interrupting their functions, and preventing those changes from taking place in the blood which are requisite to the support of the nervous and vital manifestations.

30. A. Catarrhal Bronchitis (B. Catarrhalis); Mild Bronchitis (B. Mitis); Pulmonary Catarrh, Bronchial Catarrh, Catarrhal Fever; Bronchitis serosa, &c. — This is the most common form of the disease, and generally commences with coryza,

or with slight hoarseness or sore throat, and other symptoms of catarrh extending down the larynx, along the trachea, to the large bronchi; the affection of the former parts generally subsiding as the latter become diseased. But it sometimes appears without any signs of irritation, either of the Schneiderian membrane, or of the tonsils or fauces, evidently originating in the trachea or large bronchi themselves, particularly in delicate persons, or in those disposed to coughs, pulmonary disease, and habitual expectoration.

31. A sense of roughness, with frequent attempts to clear the throat, is generally the first symptom of the disease. This is accompanied with, or followed by, titillation of the larynx, exciting a dry hard cough; hoarseness of voice, with a sense of tightness across the chest, and sometimes slight pain or soreness upon coughing or breathing deeply. Accompanying these local symptoms, more or less constitutional disturbance is generally present. The patient complains of lassitude, pain in the limbs and back, slight shiverings, or cold chills, quickness of pulse, and increased warmth, with dryness of the skin. The cough, which was at first dry, is now accompanied with a slight expectoration of a somewhat saline, glairy, and thin fluid; and as it rises towards the glottis, increases the cough, and renders the fits more frequent, probably owing to its irritating quality; in this resembling the secretion in coryza, with which it so often originates. In the slighter forms of the disease, the expectoration becomes in two, three, or four days thicker, more abundant and tenacious, less irritating, and somewhat more opaque; and with this change, the constriction, pain, and soreness, are diminished, or very much relieved; the pulse also is less frequent; the skin cooler and more moist; the urine less scanty, paler, and deposits a sediment; and the cough less frequent, although often in longer paroxysms. As the amendment advances, the sputum decreases in quantity, but is more opaque, tenacious, and deeper coloured, being frequently greenish white. This amelioration is most remarkable at first in the morning, and, as convalescence proceeds, continues throughout the day. At last but little expectoration takes place, and is observed, as well as the cough, only morning and evening. In slighter cases, the chilliness continues throughout, or alternates, with some increase of heat and perspiration; the pulse is scarcely affected unless towards evening; the expectoration is neither abundant nor very viscid; the fits of cough not severe, and chiefly in the night and morning. Such are the usual symptoms and course of catarrhal bronchitis, constituting what is usually named a cold upon the chest. But it sometimes assumes other characters; and then pulmonary catarrh is no more applicable to it than to inflammation of the substance of the lungs, in which, also, it occasionally terminates.

32. This form of bronchitis appears to consist of catarrhal irritation extending to, or originating in, the mucous membrane of the trachea and large bronchi, to which it is chiefly limited, without materially affecting the sub-mucous tissue. It seems not to be actual inflammation, or, if inflammatory action be present, it is of a peculiar or, specific kind, probably owing to its being seated in, or rather limited to, the mucous membrane; in which light it is viewed by HILDEN-

BRAND, who very justly considers catarrhal irritation to be distinct from true inflammation. This variety may assume an epidemic form, when its symptoms become somewhat modified (see INFLUENZA.); and repeated or prolonged attacks of it often favour the development of tubercles in the lungs, or even originate them, in scrofulous and delicate subjects. It may also pass more or less rapidly into either true acute bronchitis, or into the chronic form of the disease, owing to the extension of inflammatory action more generally through the bronchi, and to their sub-mucous cellular tissue.

33. *B. True Bronchitis (B. Vera); Shenica Bronchitis (B. Gravis Shenica); the Acute Mucous Catarrh of LAENNEC.*—This more decidedly inflammatory form of the disease is sometimes preceded by coryza or sore throat; and as these begin to yield, the morbid action extends along the mucous membrane to the trachea and bronchi. But it frequently also commences in this last situation, particularly in those who are liable to pulmonary disease, and to chronic coughs, and assumes a severe form. After these preliminary signs, sometimes hoarseness, or loss of voice, and always a dry hard cough, with a sense of soreness, rawness, dryness, and heat, are complained of under the sternum, preceded by marked chills or complete rigors. The chills at first alternate with increased heat and dryness of the skin; and are soon followed by quickened and somewhat laborious respiration; dyspnoea or oppression at the chest; sometimes a dull pain on coughing; quick, full, and often strong pulse; sickness or loss of appetite; pain in the forehead, back, and limbs; loss of animal strength, with an inability to leave the couch or bed; foul loaded tongue; constipated bowels, and scanty high coloured urine. As the disease advances, the frequency of pulse, the cough, expectoration, and general febrile symptoms, increase, as well as the tightness and soreness of chest; the latter sensation often amounting to an obtuse pain extending between the shoulders, to the back, and to the attachments of the diaphragm to the false ribs, sometimes with pale anxious countenance, and great oppression and anxiety. As expectoration comes on and increases, the sense of heat below the sternum diminishes. The cough is generally excited by a full inspiration; and from being short and dry, or attended by but little expectoration, becomes longer, more severe, and convulsive, accompanied with a more copious expectoration; and subsequently, in some cases, terminates in scanty vomiting, which promotes the discharge of a watery or serous and frothy mucus, sometimes in considerable quantity, which had accumulated in the bronchi and trachea. The febrile and other symptoms are aggravated towards night, which is generally sleepless and disturbed, the position of the body being on the back; but the posture is often changed. In some cases, particularly those which are not remarkably severe, each exacerbation of the fever is attended by chills; and throughout the disease, the sensibility of the surface to cold is very great. In the more phlogistic cases, especially in plethoric subjects, the dyspnoea and oppression are very urgent, the face is flushed, and sometimes slightly tumid, and the eyes injected. At a still more advanced period,

the tongue is often red at its sides and point, and deeply loaded in the middle and base; the breathing becomes rattling or wheezing, owing to the air struggling through the mucous accumulation in the bronchi, and the exertions to expectorate greater. In extreme cases of this description, collapse, with diminished expectoration, purple lips, orthopnoea, quick depressed pulse, cold perspirations and extremities, with threatening suffocation, occur as early as the sixth or eighth day.

34. The chief characteristic of this true form of bronchitis is the state of the sputum, which ought always to be carefully examined. When the disease attacks a person who never expectorates whilst in health, the cough remains dry for a considerable time; and those who expectorate habitually, cease to do so when the inflammatory attack is very acute. If the disease be slight, the sputum is often increased from the commencement, and its quality changed. As long as the cough continues dry, the disease may be said to be in its first stage. In the course of a period which varies with the constitution of the patient and the treatment employed, each fit of coughing is followed by the excretion of a clear, transparent, serous or watery mucosity, which is at first slightly saline, but afterwards becomes tasteless. It is without odour. As the disease advances, it is a glairy mucus, resembling white of egg. When it is poured into one vessel from another, it flows with extreme viscosity. The more it can be drawn out into a fine thread, and the greater its tenacity, the more marked is the irritation of the surface secreting it; the greater also being the oppression, heat, and anxiety in the chest, the violence of the cough, and the general febrile symptoms. In these very acute cases, it adheres closely to the sides of the vessel containing it by long stræ. When the fits of coughing are severe, there is a froth or sort of lather on its surface; and, in some cases, it is streaked with a little red blood, which, however, is not combined with the mucus as in pneumonia. Early in the disease, whilst the expectoration is fluid, transparent, or watery, it often contains small whitish flocculi, proceeding from the mucous cryptæ of the pharynx and fauces.

35. In proportion as the inflammation advances to resolution, the sputum loses its transparency, and is mixed with opaque, yellowish, whitish, or greenish matter, which increases until it forms nearly the whole of the expectorated mass, and is attended by a marked diminution of the symptoms: its quantity also is lessened. The inspection of the sputa thus not only serves to indicate the nature of the disease, but also its various stages. In cases of a relapse or aggravation of the inflammatory action, the sputum again becomes transparent, frothy, more abundant, and viscid; and the other symptoms increase. In several instances the disease will continue to fluctuate for several days, exhibiting symptoms of slight amelioration, soon followed by slight relapse or exacerbations, often occurring on alternate days, or at the tertian period, and assuming from this circumstance a remittent character, until either a more decided improvement takes place, or a more marked aggravation terminating in some one of the ways hereafter to be detailed (§ 39.).

36. In the two forms of the disease now de-

scribed, the minute bronchi so far escape, during the favourable course of the disease, as that no material interruption to the functions of the lungs, in respect of the changes effected on the blood during respiration, takes place in them; the air still passing through them and reaching the air-cells: but, in certain of their very severe forms and complications, and of their unfavourable terminations, and in the variety next to be noticed, obstruction to the free circulation of air, and to the changes produced on the blood, in the lungs, occurs to a greater or less extent.

37. *C. Asthenic Bronchitis (B. Asthenica); Peripneumonia Notha** of Authors; *Acute Suffocative Catarrh* of LAENNEC.—This variety of the disease generally occurs in very young, or in aged persons, in those of a phlegmatic or cachectic habit, and of lax fibres and exhausted powers of constitution, or who have been liable to chronic coughs, and to copious expectoration of a thin watery phlegm. Severe paroxysms of cough, with wheezing and oppressed breathing; foul loaded tongue; scanty urine; complete loss of appetite; very quick, small, or irregular pulse; little or no increase of heat, excepting at night; cold extremities; vertigo; pain in the head; exacerbating fits of dyspnoea, with a scanty expectoration at the commencement, gradually becoming abundant and frothy; are its chief symptoms in persons advanced in life. It is much less acute or phlogistic in its character than the preceding variety; and its duration is longer. In the more severe cases, the countenance is pallid and anxious; the oppression of the præcordia extremely great; and a full breath taken to relieve it brings on a severe fit of coughing, which sometimes terminates in vomiting, and relieves for a time the symptoms by favouring the excretion of the accumulated mucosities. The tongue is often dry, and brownish red at its point and edges, and sometimes covered at its base with a dark coating; the breathing is much more difficult; the lips and nails assume a blue livid appearance; the face becomes lurid or dusky; the patient cannot lie down in bed, or, if he does, starts up, after falling asleep, with a sense of suffocation; and the symptoms indicate either collapse, and obstruction of the air-passages, or effusion of fluid in the thoracic cavities, or even both: stupor or sopor; weak, wiry, and very frequent pulse; marked diminution of the sputa, cold extremities, orthopnoea, clammy sweats about the face and neck, suppressed urine, &c. ushering in a fatal termination.

38. This is, upon the whole, the most common form of bronchitis which is met with in children, particularly in the metropolis, and among the children of the poor, ill fed, and ill clothed, and those living in cellars, ground-floors, and badly ventilated lanes and apartments, and is often remarkably prevalent during the winter and spring. In this class of patients its approach is often insidious; and it usually commences with coryza, but not infrequently also with chills, febrile symptoms towards evening, wheezing, quick breathing,

* "*Peripneumonia notha* fortior nobis bronchiorum catarrhus est, quo in pituitosis, obesibus, senibus, cachecticis, laxisque hominibus frigida et humida sub temperate, ab accedente membrana mucosæ hos canales invadentis irritatione, copiosior, tenaxior pituita celeriori passu secreta bronchiorum fines opplendo, suffocationem sat cito minuat." (J. P. FRANK.)

and cough. There is at first little or no dyspnoea; but the tongue is loaded, the pulse accelerated and full, the face pallid or tumid, and the child has lost its animation. As the disease advances, the breathing becomes more quick and laborious; and fits of dyspnoea come on, generally followed by severe attacks of cough, which often terminate in vomiting; on which occasion only the bronchial secretion is presented for examination, and is found to consist at first of a viscid, watery mucus, and afterwards of a yellowish white, or a tenacious matter. These exacerbations are followed by remissions, during which the child dozes, and appears relieved, and the pulse becomes less frequent. Thus the disease may continue, with alternate remissions and exacerbations, for many days, until either a permanent diminution of the symptoms takes place, or an increased frequency of pulse, stupor, lividity of the lips, nails of the fingers, convulsions, &c. supervene, and indicate impending suffocation, with congestion or watery effusion on the brain.

39. TERMINATIONS. — *A. Duration.* The *sthenic* variety of the disease usually runs its course in about seven or nine days; but it may terminate either way as early as the fifth; or it may be prolonged to the 21st, or even the 28th day. Its duration will, however, chiefly depend upon the treatment employed, the complication it may present, the severity of the symptoms, and on the age and constitution of the patient. The *asthenic* form of bronchitis generally runs its course in a slower manner; it seldom terminates either way in less than fourteen days, and generally continues for several weeks (§ 37.).

40. *B. In favourable cases,* the *sthenic* form of the disease begins to decline from the fifth to the ninth day. The change is first evinced by the state of the sputum, as above described (§ 35.); by an amelioration of the cough, dyspnoea, and febrile symptoms: in rare instances, by copious epistaxis; by a more general and copious perspiration than that which frequently terminated the febrile exacerbations; by a more copious discharge of a paler urine, depositing a sediment; and by a diminution of the dyspnoea, of the frequency and severity of the cough, and of the quantity of the expectoration, which becomes pearly, opaque, thick, yellowish, or greenish yellow; at last, febrile symptoms recur only towards evening, and the disease disappears as in the first variety (§ 31.).

41. *C. This favourable change is not, however,* always observed, particularly when the attack is very severe, when treatment has either not been soon employed, or has not been sufficient to remove the disease, or when the secretion into the bronchi has been very profuse, and expectorated with much difficulty. In such cases, it either lapses into the chronic state about to be described; or, owing to the extension of the inflammation, to the air-cells and substance of the lungs, gives origin to pneumonitis, and even to pneumonitis combined with pleuritis, which is thus superadded to the original disease; or, from the great extent of surface affected, the consequent irritative fever, and interruption to the pulmonary functions, and the profuse viscid fluid filling up the bronchi, collapse of the powers of life supervenes, and the patient dies, either with cerebral affection, or with the usual symptoms of asphyxy, consequent

upon diminished discharge of the morbid secretion, and its accumulation in the air-tubes.

42. *a.* When the disease thus terminates in *pneumonia*, the sputum becomes more rounded, thick, tenacious, and streaked with blood, which is more or less intimately mixed with it, and sometimes of a dark colour, giving it a rusty appearance; and the cough is more tight, hard, and deep. The oppression also increases; the cheeks are flushed with circumscribed red; the pain of chest is more severe, or is now complained of for the first time; the skin is partially covered with moisture, sometimes very abundant in parts; the chest, which was hitherto sonorous throughout, is dull, in some part or other, upon percussion; and the auscultatory signs of severe and dangerous pneumonia appear, on which delirium and other unfavourable symptoms often supervene, and terminate, with coma, the life of the patient.

43. *b.* Bronchitis, as it occurs either in the *sthenic* or *asthenic* form, may also terminate in chronic pleuritis, and in effusion of serum into the pleural cavity, and in some instances also into the pericardium, particularly in persons advanced in life, and in those who have experienced difficulty in the circulation through the cavities of the heart. In some instances of this description, the expectoration, and many of the other symptoms, are suddenly or quickly diminished; but the dyspnoea continues, and signs of effusion become more apparent as those of bronchitis disappear. In these, the consecutive effusion occurs in the form of a translation or metastasis of the morbid action from the mucous to the serous surface. In other cases, symptoms of pneumonitis, or pleuritis, intervene between the change in the bronchitic symptoms and the occurrence of effusion, with pain, more or less severe, loss of resonance in some part of the chest, and other auscultatory signs, indicating the extension of the inflammatory action first to the small bronchi, and thence to the substance of the lungs and the pleura. Dr. HASTINGS has detailed some cases of this termination in his work, and I have treated several instances at the Children's Infirmary; but it is chiefly the aged who are liable to this unfavourable occurrence.

44. *c.* In other unfavourable cases, the disease becomes, in the course of a few days, characterised by failure of the energies of life; oppression and uneasiness increase; the cough is more frequent, laborious, and convulsive; the sputum is either more abundant, frothy, tenacious, and glairy, or gelatinous, and excreted with great difficulty, or much diminished in quantity from want of power to excrete it; the pulse is more rapid, small, weak, and irregular, or intermittent; the pain of head more distressing; the countenance is pale, and the face and neck covered with a clammy sweat; the respiration very frequent and wheezing, sometimes with an audible rattle; and, at last, delirium, lividity, at first of the lips, afterwards of the countenance, great prostration of strength, and coma, supervene, and the patient sinks with all the signs of imperfectly changed blood. In some cases, cerebral symptoms come on much earlier, with either violent or low muttering delirium, which soon terminates in most profound coma. In a few cases, this early accession of delirium, or of violent headache, with other symptoms of consecutive inflammatory action,

ending in serous effusion on the brain, altogether removes the original bronchial inflammation, or in others moderates it greatly and masks it. I have observed this in *children*, and once or twice in robust adult persons; but in both classes of subjects it is a dangerous occurrence. More commonly, however, the cerebral symptoms continue increasing, with those referrible to the bronchi, till life is extinguished.

45. In other cases of very acute bronchitis, with very high fever and severe local symptoms, particularly with quick, laborious, short respiration, dyspnoea, anxiety, great sense of heat under the sternum, and bloated countenance, collapse takes place rapidly, particularly if an appropriate treatment have not been early employed; and either delirium, coma, and other cerebral symptoms, or those more directly depending on the circulation of venous blood, appear, and the patient is speedily cut off. In weak and nervous patients, and during unfavourable states of the air, the inflammatory action sometimes seems to invade nearly all the respiratory mucous surface, and is soon productive of a copious mucous secretion, which, either from its difficult excretion or rapid secretion, in some cases, speedily suffocates the patient.

46. In *children*, and rarely in adults, cases occur, in which the inflammatory action extends upwards, to the *trachea* and *larynx*, occasioning all the symptoms of laryngitis in addition to those of bronchitis, and frequently terminating fatally with convulsions and the signs of congestion in the head. In many of the unfavourable cases of bronchitis in children, the extent of the disease, and the copious secretion, occasion suffocation more or less rapidly, with somnolency, bloated, or livid countenance, convulsions, coma, and, at last, complete asphyxy: and, on dissection, congestion of blood, with watery effusion, is found within the cranium; the bronchi are filled with a muco-purulent matter, and the vessels of the lungs are loaded with blood.

47. COMPLICATIONS.—The most common states of complication, in which bronchitis presents itself in practice, are, 1st, With catarrhal sore throat, coryza, &c. of which it is generally consecutive, and with catarrhal inflammation of the pharynx and œsophagus. 2d, With inflammation of the trachea, or larynx, or both, of which it is most frequently consecutive; but also sometimes antecedent, as I have occasionally observed in children. Indeed, we have seldom croup in London uncomplicated with bronchitis in some one of its forms or states. 3d, With measles, scarlatina, or small pox, on which it very frequently supervenes; particularly in measles, sometimes very early in the disease, and before the eruption breaks out; but oftener in consequence of its premature disappearance, or retrocession. 4th, Very commonly with hooping-cough, especially during certain seasons and epidemics. 5th, Not infrequently with continued fevers, particularly in its asthenic form. 6th, Often with disorder, or even sub-acute inflammation, of the digestive mucous surface, and diarrhoea, in children, when it also assumes this form; the stools being offensive, and the tongue red at its point, &c.* 7th, With dis-

ease of the liver, and accumulations of bile in the gall-bladder, chiefly in adults; the tongue then being very deeply loaded with a yellowish brown crust, or fur; and the stools dark coloured, and most offensive. 8th, In some cases with erysipelas, particularly its epidemic and infectious form. 9th, With pneumonia, or pleuritis; th being either consecutive of the bronchitis, or simultaneous with it. 10th, With dropsical effusion into the pleura or pericardium, especially in aged persons: and, 11th, With inflammatory irritation in the substance of the brain, or in its membranes, with disposition to effusion,—a complication most commonly met with in children.

48. All these diseases are greatly aggravated, and their danger increased, from being associated with bronchitis; and they frequently terminate fatally by one or other of the unfavourable states which the bronchial affection assumes. Bronchitis thus complicated also presents, in consequence, either a more acute character, or the asthenic form; and, being attended by a more marked disposition to invade the smaller ramifications and air-cells, or by a more profuse secretion of mucus, and a rapid depression of the powers of life, the unfavourable terminations above described quickly supervene. In several of these complications, particularly with pertussis, measles, scarlatina, continued fever, cerebral affections, and diseases of the lungs or pleura, bronchitis often escapes detection, until it becomes either one of the most important, or the most dangerous, or an actually fatal lesion. When thus complicated with measles or other exanthematous diseases, the eruption, if it still continue on the surface, often assumes, as the powers of life sink, a dark or purplish hue; and a slight dirty blueness of the skin, particularly of the face, hands, &c. is generally observed in other cases, indicating the impeded functions of respiration, and the consequent changes in the blood. The frequency and importance of the complication of bronchitis with measles, especially before the appearance of the eruption, during its progress, and after its decline; and the occurrence of the former complaint, both during and after convalescence from the latter; are deserving of the careful attention of the practitioner.¹

49. ii. SUB-ACUTE BRONCHITIS is characterised by the symptoms of the sthenic form of the disease in a milder and more chronic form. The cough continues longer dry, and the expectoration scanty, or thick, viscid, gelatinous, or albuminous, with tightness of chest, and oppressed breathing. In this form of the disease, a plastic albuminous exudation sometimes forms in the large bronchi, and lower part of the trachea, or in the large bronchi of only one lung, and is moulded in the form of the air-tubes; and is either expectorated in fragments, or in large tubular branches and ramifications. Cases of this description are detailed under the appellation of bronchial polypus by the older writers, and figures given of them by TURPIN and others. MR. LEEF has published (*Lond. Med. Repos.* vol. xviii. p. 207.) a case of this description, wherein this production retained its ramified and tubular form. I have met with two cases where the albuminous exudation had been formed in the

* During some seasons I have occasionally admitted in one day, at the Infirmary for Children, several cases, in which it was difficult to determine whether the digestive

or the respiratory mucous surface was most affected. This complication is not infrequent during convalescence from the exanthemata, particularly measles and scarlet fever.

bronchi, and expectorated in fragments. It generally occurs in an uncomplicated state.

50. iii. CHRONIC BRONCHITIS often follows severe attacks of catarrh; and is also frequently consecutive of acute bronchitis; but it sometimes occurs primarily in the chronic state, particularly in aged persons. It differs in nothing from the acute or sub-acute forms, excepting in as far as the symptoms are altogether milder, and their continuance longer; there being no distinct line of demarcation between its grades of activity and chronicity. The chief means, by which we are enabled to infer, that the disease has assumed a chronic form, when it is consequent on the acute, is the continuance of the sputum for several days, in undiminished quantity, and the persistence of the opaque, whitish yellow, or yellowish green appearance, which it assumed upon passing from the transparent, fluid, and viscid condition characterising the acute form.

51. Chronic bronchitis assumes various grades of severity, and presents different phenomena, according to the changes which have taken place in the bronchi. In its *slighter states*, and primary form, as it is often met with in persons advanced in life, and as it prevails during winter and spring, or variable seasons, it consists chiefly of a frequent and almost habitual cough, with scarcely any pain in the chest, continuing for weeks, or even months, or recurring every autumn, winter, and spring; being most severe in the mornings, and much easier through the day, with slight dyspnoea on exertion, and copious viscid mucous expectoration; but without any marked febrile symptoms, excepting slight acceleration of pulse. Its *severer forms* are met with in young or middle aged persons, after catarrh or acute bronchitis; and are attended with fits of coughing, and copious expectoration; with oppression at the chest and præcordia; with febrile symptoms, particularly towards night; with copious perspirations in the morning, which often seem to increase the cough instead of relieving it; with loss of strength, emaciation, and slight disorder of the digestive organs. The cough is increased after getting into bed, and very early in the morning. The breathing is quick and laborious, particularly on any exertion; and the patient complains of slight tightness of the chest. The pulse generally ranges from 90 to 120; being the former whilst quiet in bed, and the latter towards evening.

52. Attention to the *expectoration* is very important, in order to enable us to judge both of the accession of this state of the disease, or of its aggravation or change into the acute form, which is not infrequent, and of the concurrent or consecutive alterations which often take place. The sputum occasionally continues long in the state now described. It is generally then inodorous, and without taste. But it often becomes greenish, or yellowish white, or mucopurulent; is mixed with a colourless watery phlegm, and is more or less abundant. In cases of a worse character, particularly when hectic symptoms are present, it assumes a more purulent appearance; is sometimes streaked with blood, or mixed with dark specks of blood, or consists chiefly of pus. These changes, however, seldom occur without much antecedent fever, and attendant emaciation, night sweats, occasional diarrhoea, and the symptoms of confirmed hectic. In rarer cases, the sputum

becomes remarkably foetid; but this change cannot be imputed to any particular lesion of the bronchi or lungs, excepting sometimes to considerable dilatation of the former. The whole of the symptoms in this class of cases so very nearly resemble tubercular consumption, as to be distinguished from it with much difficulty, and only by attending to the appearances of the sputum, and by examining the chest with the stethoscope.

53. The *sputum* generally partially swims on the surface of water. When it is thin, transparent, viscid, and frothy, it usually altogether swims; but when it is thick, in tenacious, opaque lumps, or in fragments resembling portions of albuminous exudation, it generally sinks. In all these states it cannot be diffused in the water. When it consists of yellowish white, or greenish yellow matter, it partly sinks, and by agitation is broken into ragged portions, and is partially diffused; and the more it approaches a purulent state, the more completely and readily is it diffused, imparting to the water, by agitation, a yellowish white appearance.

54. Chronic bronchitis is also sometimes *consecutive* of the eruptive diseases; but these diseases have generally altogether or very nearly subsided before the bronchial affection supervened. It occurs primarily from the irritation of minute particles of mineral or vegetable substances floating in the air, as is shown in the article on *ARRS*. It is sometimes also *complicated* with other chronic diseases of the lungs and pleura, more especially with *tubercles*; with diseases of the liver; with chronic inflammation, or other disorders of the mucous surface of the digestive tube, particularly of the œsophagus, stomach, and large bowels. In all these consecutive and complicated states, it presents no certain or unvarying forms; its chief character, its duration, progress, and termination, being modified by its severity, by the constitutional powers of the patient, by his diathesis, and by the quantity of expectoration. In some cases, the secretion from the bronchial surface is so profuse as to be the chief cause of the exhaustion and death of the patient.

55. iv. ANATOMICAL CHARACTERS OF BRONCHITIS.—A. When the body of a patient is opened, that has sunk under any disease whilst affected at the same time with a *mild and recent bronchitis*, some redness is found, generally in a circumscribed portion of the mucous membrane, and usually towards the end of the trachea, and in the first divisions of the bronchi. If the inflammation have been more *intense*, the redness extends to a greater number of these tubes, and exists, moreover, in the smaller ramifications. It sometimes happens that this redness is exactly limited to the bronchi of one lobe only; and it is the bronchi of the superior lobe which seems to be more particularly disposed to inflammation. The red colour of the bronchi presents itself occasionally under the form of a fine injection, which seems to exist both in the sub-mucous cellular tissue, and in the mucous membrane itself, and is usually attended by slight tumefaction. Sometimes the vessels cannot be distinguished, but only a number of small, crowded, red points, which are agglomerated the one around the other. Finally, an uniform red colour is occasionally observed. In some cases, the redness diminishes progressively from the large bronchi to the

small ones; in others, an opposite disposition is remarked. Occasionally the redness only exists in intervals, in the form of bands or of isolated spots, forming, as it were, as many circumscribed phlegmasiæ, between which the mucous coat is white and healthy.

56. *B.* When the inflammation is *chronic*, the mucous membrane generally loses its lively redness: it presents a livid, violet-coloured, or brownish tint. Finally, and what is very remarkable, in individuals offering all the symptoms of inveterate chronic bronchitis, with puriform expectoration, the mucous membrane of the lungs has been found scarcely rose-coloured, and even perfectly pale through its whole extent. *BAYLE* and *ANDRAL* have particularly noticed this fact. I would not wish to conclude that there is not, and least of all, that there has not been, inflammation in these cases; but I think a very copious secretion will often take place from mucous surfaces, and assume even a purulent appearance during its retention in the bronchi, from lost tone of the extreme capillary vessels, with, perhaps, an increased flux or determination of the circulating fluid in order to supply the discharge, all vascularity disappearing with the cessation of circulation. The other changes observed on post mortem inspection, particularly in the more chronic states of bronchitis, consist chiefly of thickening, softening, ulceration, &c. of the mucous membrane, dilatation of the bronchi, &c. (See § 7, et seq.).

57. *V.* *DIAGNOSIS.*—The characters of the cough, and of the sputa, and the physical signs, are our chief guides in the diagnosis of bronchitis. The history I have given of the disease will be generally sufficient to enable even the inexperienced to recognise it: but it will often be necessary to arrive at more precise and certain information as to the extent of lesion, and its existence either in a simple or in a complicated form.

58. *A.* *Of the acute.*—*a.* *By auscultation.* In the first stage of the disease, the inflammation causes tumefaction of the mucous bronchial surface, and consequent diminution of the calibre of the tubes. This state occasions a modification of the respiratory sound in them: and, hence, either with the unaided ear, or with the stethoscope, we hear at first the “dry bronchial rhonchus;” consisting chiefly of a sibilous or whistling sound; occasionally with a deeper tone, resembling the note of a violoncello, or the cooing of a pigeon, particularly when the large bronchi are affected. These sounds (see *AUSCULTATION*, § 14.), denominated the *sibilous* and *sonorous rhonchi*, are present chiefly in the early stage, and before expectoration takes place; and prove the accuracy of the rational inference of *DR. BADHAM*, that the difficult breathing of this period is owing to the state of the mucous membrane; and I would add, of its sub-mucous cellular tissue also. To these sounds is added the *mucous rhonchus*; and in proportion as the bronchial secretion, to which it is owing, augments, this sound becomes predominant. When the inflammation is seated in the large tubes, the bubbles of mucous rhonchus are large and uneven; and the respiration may be still heard over the chest. But when the mucous rhonchus is fine, and is heard constantly, it may be inferred that the small bronchi are invaded. When this is the case in a severe degree, there is

also slightly diminished resonance of the chiefly affected part upon percussion. As the disease proceeds, and the secretion passes into an opaque and thickened state, the mucous rhonchus becomes interrupted, sometimes with obstruction of the respiratory sound in a portion of the lungs, and passes into a sibilant or clicking sound. These changes arise from the entire or partial obstruction of one or more tubes by the thickened mucus, and are generally of temporary continuance: occurring now in one part of the chest, and disappearing; and now in another. This state of the bronchi fully explains the dyspnoea of this stage.

59. *b.* *Rational diagnosis.*—*a.* The cough in bronchitis is loose, diffused, and deep; in paroxysms, and attended with fever, often with wheezing. In *pertussis*, it is in severe paroxysms, unattended by fever or wheezing; is accompanied with a distinct whoop; and terminates in vomiting. In *croup* it is sonorous, clanging, and harsh. In *laryngitis*, it is suffocating, shrill, or grunting; and, on inspiration, attended with a drawing down of the p^ostum Adami to the sternum, and retraction of the epigastrium and hypochondria. In *pneumonia*, it is deep in the chest; frequent and short, often hard; and gives a metallic sort of noise. And, in *pleuritis*, it is short, dry, hard; sometimes slight, but always suppressed and painful. *β.* The expectoration in bronchitis is abundant after the second or third day, or even from the first: in *pertussis*, it only follows the vomiting: in *pneumonia*, it is more rounded, distinct, thickened, purulent, rusty, and intimately streaked with blood: in *pleuritis*, *croup*, and *laryngitis*, it is scanty, thin, frothy in the latter; sometimes with shreds or pieces of lymph, and entirely different in appearance from that of bronchitis. *γ.* Pain in bronchitis is scarcely complained of; and consists merely of a sense of soreness, heat, and tightness in the chest, particularly beneath the sternum, and is not increased on full inspiration: in *pneumonia*, it is more marked, especially in certain parts of the chest, generally nearer the lateral regions, and is increased on inspiration or prolonged expiration: in *pleuritis*, it is very acute, and a full inspiration is impossible: in *croup* and *laryngitis*, the pain is increased upon pressing the trachea and larynx. *δ.* The countenance in bronchitis is more frequently pallid or bloated; in *pneumonia*, it is generally flushed; and dyspnoea is greater in the former than in the latter. The breathing is wheezing and hurried in acute bronchitis; in *pneumonia* it is less so, and generally without the bronchial wheeze. The pulse, in the former, is frequent, full, free, developed, and soft; in the latter, full, hard, bounding or vibrating, and sometimes oppressed and undeveloped. The general febrile symptoms are more continued in *pneumonia* than in bronchitis; morning remissions, with free perspiration, being more frequent in the latter than in the former. The physical signs in *pneumonia*, *pleuritis*, &c., are the surest means of their diagnosis. (See art. *LUNGS* — *Inflammation of.*)

60. Some cases of *asthenic bronchitis* may be mistaken for *humoral asthma*; and occasionally no very distinct line of demarcation can be drawn, both affections either insensibly passing into each other, or being complicated with one another. But, generally, the slow accession of the former,

the more continued and less urgent dyspnoea and tightness of the chest, and the presence of febrile symptoms, particularly great quickness of pulse, will distinguish it from humoral asthma; which is commonly characterised by the sudden accession of the paroxysms, their severity during the night, and the attendant orthopnoea, the more or less complete and prolonged intermissions, and especially by the absence of fever, and by the much more marked integrity of the vital and animal powers, than in asthenic bronchitis. In this latter disease, the patient is incapable of leaving his bed or his apartment: in asthma, he may attend to his avocations; or may, at least, change his room in the intervals between the fits. The diagnosis between the *asthenic* bronchitis and asthma is attended with no difficulty. (See *ASTHMA*, § 50.)

61. *B. Of the chronic.*—*a. By auscultation.* The physical signs of this form of bronchitis are not materially different from the acute. The respiration is extremely varied: being sometimes louder, at other times more obscure than natural, and generally accompanied with the *mucous rhonchus*; which, however, is not heard over the chest, but now chiefly in one part and then in another, and seldom during the whole of the respiratory act. The occasional occurrence of the *sibilous* and *sonorous* rhonchi indicates that the tubes are sometimes partially obstructed; but this is much less frequent than at the commencement of acute bronchitis; and it rarely happens that the respiration is entirely interrupted in a part of the lung. Very often, also, when the dyspnoea is considerable, or even urgent, the air is heard to enter the lungs as well as usual, the respiratory sound being either distinct or puerile. The resonance of the chest on percussion is scarcely diminished. When the bronchitis is very chronic, the tubes sometimes become *dilated*, from being weakened by the inflammation and strained by the paroxysms of coughing. When this state of the bronchi exists, the sputum is often foetid, and several of the auscultatory signs of tuberculous excavations of the substance of the lungs are present. If the dilations be large and rounded, it may furnish *pectoriloquy* and the *cavernous rhonchus*; but if, as is more generally the case, it extend to several tubes, or if they be dilated along a considerable portion of their axis, a loud *bronchophony* is only heard. If this dilatation be extensive, bronchophony, bronchial respiration, sometimes with a "*reiled blowing*," and even slight pectoriloquy, will be heard in corresponding parts of the thorax. On percussion, the sound is often somewhat less than natural, owing to the compression of the surrounding pulmonary tissue; and owing, also, to this cause, the dyspnoea is often great. Dilated bronchi remain long stationary; tuberculous excavations generally increase rapidly. The former are most frequently situated in the scapular, mammary, and lateral regions; the latter in the sub-clavian and sub-acromion regions of the chest. (See the diagnosis in *Tubercles* in the LUNGS.)

62. *b. Rational diagnosis.*—It is chiefly with tubercles in the lungs that chronic bronchitis is liable to be confounded; and, indeed, without the aid of auscultation, the diagnosis between them is very difficult. When they both co-exist, and especially when the latter is attended with dilat-

ation, we have seen that even auscultation does not easily enable us to ascertain the exact state of disease: however, by a careful comparison of the physical and rational symptoms of both, we may generally form a tolerably correct opinion. Early in chronic bronchitis, the absence of pain during inspiration, the capability of resting on either side, the pallidity of the lips and countenance, the appearance of the sputum (§ 34, 35.), and the wheezing noise on respiration, may readily distinguish it from tubercular phthisis. As the disease advances, the symptoms more nearly resemble tubercular consumption; but the pallor of countenance and absence of pain generally continue; or, if the latter be present, it is diffused over the chest, and the patient can draw a larger volume of air into the chest, and retain it longer, than in phthisis. The dyspnoea is less on exertion, consists more of a stuffing sensation, and is more relieved by expectoration; the sputum generally consists of a more considerable portion of mucus, and is more regularly abundant; and the perspirations are much more partial, the emaciation less, and the paroxysms of hectic much less regular, than in tubercular disease. The cough is very different. In chronic bronchitis, it is generally deep and sonorous, and in paroxysms; in phthisis, it is short and tickling. When we find copious purulent expectoration, but without broken-down portions of softened tubercles or of the pulmonary tissue; night sweats; hectic fever, with full deep cough, and absence of the physical signs of phthisis;—if, after repeated examinations, there can be detected neither a constant absence of the respiratory murmur, nor gurgling cavernous rhonchus, nor pectoriloquy, nor marked defect of resonance on percussion,—we may safely conclude the disease to be chronic bronchitis. When this disease depends upon the inhalation of irritating substances, as Dr. HASTINGS very justly remarks, the cough and copious muco-purulent expectoration often continues for months, or even years, without much suffering, with pale countenance, slight lividity of the lips, &c. In these cases there can be no difficulty in the diagnosis.

63. *vi. PROGNOSIS.*—*A. In the acute.* When the disease is slight, or limited to a few bronchi only, the disease generally terminates favourably. The change is indicated by a more perfect anorexia in the mornings, less severe and less frequent cough, easier expectoration, and a thicker and more opaque sputum; which, however, generally assumes a more fluid and glairy appearance for a few evenings during the febrile exacerbation. A *relapse* of the disease is indicated by increase of the fever and cough, and a more transparent, fluid, and glairy expectoration. When the inflammation is very severe and general, as indicated by high fever, dyspnoea, &c., the prognosis should be unfavourable, or given with caution. If symptoms of collapse have appeared, and the mucous rhonchus be heard universally, and with little or no respiratory murmur upon auscultation; if the pulse become very frequent, small or weak, irregular or intermittent; and if the countenance be at the same time pallid and anxious, slightly livid, or the nails of the fingers and lips tending to purple; the danger from asphyxia is extreme. When the disease occurs in the course of continued or exanthematous fevers, in some epidemic states of whooping-cough, and in the other severe

forms of complication (§ 47, 48.); and when the signs indicating the unfavourable terminations already enumerated appear, the danger is also great, although it may not be extreme. The supervention of pneumonia or pleuritis, or of tracheitis or laryngitis; a sudden diminution of the expectoration; the occurrence of cerebral symptoms, of orthopnoea, or even continued dyspnoea, with expansion of the nostrils; a dark red colour of the tongue; are all unfavourable circumstances, and indicate imminent danger. On the other hand, when spontaneous evacuations occur, with a favourable change in the cough and expectoration, particularly on one of the critical days, although the attack has been extremely severe, a favourable result may be looked for; more particularly if the disease proceeded from cold, and was uncomplicated.

64. *The asthenic form of the disease is very dangerous, when occurring at the extremes of age; but less so when it is unattended by marked depression of the powers of life, and by signs of the circulation of venous blood, — circumstances which, in connection with the frequency, weakness, and irregularity of the pulse, the quantity and appearance of the sputa, and with the difficulty of expectoration, constitute the danger.*

65. *B. In the sub-acute and chronic.*—If it have arisen from catarrhal affection, and be unattended by much emaciation or hectic, this form of the disease will generally terminate favourably, although the expectoration present a puriform appearance. The more purulent, however, this excretion, and the more marked the symptoms of hectic, the greater the danger. But when the sputum seems to consist chiefly of mucus, although the quantity expectorated be great, a favourable issue may take place; and this will be more frequently the case when the chronic bronchitis has been consecutive of the acute. When there are constant dyspnoea, very frequent pulse, profuse sweat, and copious purulent expectoration, with emaciation, hectic fever, colliquative diarrhoea, associated symptoms of disease of the liver, or of the mucous surface of the bowels, with a smooth, glossy, or chopped, a dark red, or raw appearance of the tongue, a most unfavourable prognosis should be given; and if to these succeed aphthous eruptions about the mouth and tongue or fauces, little hope of recovery can be entertained. The causes and complications of the disease should also materially influence our prognosis. When it has arisen from mechanical irritation of the bronchi, patients often recover from a very unfavourable state, when the irritating cause has altogether been removed. The occurrence of bronchitis in the scrofulous diathesis, and its association with tubercles in the lungs, are dangerous circumstances. This complication is to be ascertained chiefly by means of the physical signs. If these indicate the existence of tubercles, or do not establish with certainty their absence, a very cautious opinion should be given. The mucous rhonchus, and dulness on percussion, with the rational symptoms of tubercles, are indications of a very dangerous malady. The rapid development of symptoms of the acute, in the course of chronic bronchitis, must be viewed as an unfavourable circumstance. The extremes of age also increase the risk in this as well as in the acute state of the disease,

66. *CAUSES.*—*A.* The predisposing causes are, whatever lowers the energies of the frame, more particularly too warm or crowded apartments; sleeping with too many clothes; late rising, late hours, and too great sexual indulgence; very early, and far advanced age; the lymphatic and sanguineous temperaments; relaxed habits of body; febrile and exanthematous diseases, and the suppression of accustomed eruptions and discharges.

67. *B.* The exciting causes are, exposure to a cold and moist atmosphere, or to currents of air, particularly when perspiring; rapid vicissitudes of weather and season; wearing damp clothes or shoes, or sleeping in damp beds or linen; continued exposure to dry cold; quick refrigeration of the body after being over heated and fatigued, or upon coming from crowded apartments and assemblies; wearing too low or very thin dress, with exposure of the neck and chest; rapid atmospheric changes, particularly during autumn, winter, and spring, and especially from cold to heat; epidemic constitutions of the atmosphere; easterly and north-east winds; exposure to the night air after rain; the inhalation of irritating gases, vapours, or mineral or vegetable particles (see ARIS AND EMPLOYMENTS, as *Causes of Disease*, § 40.); sudden passage from the cold air into overheated apartments; catarrhal infection; miasmatic exhalations in cold and moist states of the air; the imperfect irruption or retrocession of the exanthematous diseases; and the translation or metastasis of gout, rheumatism, erysipelas, &c.

68. vii. TREATMENT.—1st, OF ACUTE BRONCHITIS.—*A.* In its simple states. M. BROUSSAIS gives a very concise view of the indications of cure in this form of the disease, which has been adopted, *verbatim*, by Dr. HASTINGS; without, however, referring to the original writer. M. BROUSSAIS very justly recommends that the excitement of the sanguiferous system should be moderated, by general blood-letting, acidulated and mucilaginous fluids, and abstinence from stimulating food; that perspiration be favoured, by saline and antimonial medicines, and by emollients, both internally and externally employed; and that, the irritation and congestion of the diseased vessels be relieved by local depletions and emollient resurgents when erythema of the capillaries predominates, and by rubefacients and vesicatories when the nervous powers are depressed.

69. *a.* In the first variety of the disease, blood-letting is seldom requisite; saline and antimonial medicines, with demulcents, emollients, &c. being generally sufficient. When, however, fever is considerable, and the patient complains of soreness or slight pain in the chest, a moderate bleeding—preferably by cupping—will be serviceable; and full doses of antimony, or as much as the stomach will bear of the solution of tartarised antimony, in frequently repeated doses, will soon remove all febrile disturbance. The following mixture has generally answered this purpose in my practice (see also F. 393. 854.):—

No. 66. R. Mist. Camphoræ, Mist. Amygdal. Dulc., aa ʒij; Liq. Ammoniac. Acet. ʒjss; Spirit. Ether. Nit., Vin. Antimon. Tart., aa ʒjss; Syrup. Tolutan. ʒjss. M. Capiat coch. ij. larga secunda quaque hora.

70. In the third variety, or the asthenic form of the malady, blood-letting is generally required; but it ought to be resorted to with much caution, and early in the disease, as recommended by SYDENHAM and most practical writers of the present

day. From eight to ten ounces may be taken from a vein, but, I think, preferably from between the shoulders by cupping; and afterwards, revulsants, counter-irritants, and expectorants, may be employed. The admissibility of depletion, or of antimonials, or the extent to which they should be carried, and the propriety of having recourse to stimulating expectorants, necessarily depend, in this form of the disease, upon the degree of morbid action and of vital power presented by individual cases, and upon the quantity of the expectoration and the difficulty to excrete it. Moderate local depletions are more generally required when this state of disease occurs in children, than when it is met with in aged persons; whilst the latter are more benefited by expectorants, diaphoretics, counter-irritants, and diuretics, than the former class of subjects.

71. In the *second variety* of bronchitis, particularly when the patient is young, plethoric, or robust, blood-letting should be early and energetically employed, and be directed as recommended in the art. on the BLOOD (§ 64.); and a full impression made upon the circulation, short, however, of syncope. Immediately afterwards, the preparations of antimony, combined according to circumstances, should be given in full and frequently repeated doses, so as to prevent the return of excessive local or general action, and to promote a free and universal perspiration. The preparations of antimony that may be selected for this purpose are the ant. tartar., James's powder, or the kermes mineral (F. 637.); and the first doses of them may be advantageously combined with calomel. The following may be exhibited; or F. 24. 513. 530. 638., or other similar formulae, contained in the Appendix:—

No. 67. R. Hydrag. Submur. gr. vi.; Pulv. Jacobi Veri gr. v.; Camphoræ rasæ gr. j.; Extr. Hyocyami gr. v.; Conserv. Rosar. q. s. ut fiat Bolus statim post venesectionem sumendus.

No. 68. R. Mist. Camphoræ ʒj.; Liq. Ammon. Acet. ʒij.; Potassæ Nitratis gr. vi.—x.; Spirit. Æther. Nit. ℥xx.; Vin. Antimon. Tart. (vel Vin. Ipecacuanhæ) ℥xx.—xxx.; Tinct. Hyocyami ℥xx.; Syrup. Tolutan. ʒj. M. Fiat Haustus, tertius horis capiendus.

When antimonials are given in as large doses as the stomach will bear, and frequently repeated after the first full depletion, a second will not often be necessary; or local blood-letting will be sufficient. But if the febrile excitement and the state of the pulse and of the blood drawn indicate it, venesection may, in robust subjects, be again repeated to the extent already indicated. When this variety of the disease affects children, blood-letting, either general or local, according to the age, should be prescribed, with saline diaphoretics, followed by the semicupium or pediluvia. In all classes of subjects, *blood-letting* must be regulated according to the state of the pulse, heat of skin, the character and quantity of the expectoration, the presence of pain, and the prevailing character of diseases; attention to these circumstances being especially required in children and aged persons.

72. *b. The choice of diaphoretics* in this disease is deserving of notice. Early in the *first and second varieties* I have usually preferred tartarised antimony, generally in solution, and conjoined with the vin. ipecacuanhæ, or with the spirit. æther. nit., small doses of camphor, &c. But in infants or very young children, in the aged, and in the *third or asthenic form* of the disease, ipe-

cacuanha seems preferable,—in the latter class of subjects particularly, combined with camphor. In the more catarrhal, or less acute, forms of the complaint, ipecacuanha, combined with nitrate of potash and opium; and, in the more asthenic states of the disease, the same medicines, in larger doses; will often prove equally serviceable as the preceding. While febrile excitement continues much increased, diaphoretics or diuretics are often exhibited with little advantage, as the restoration of these secretions is rather the consequence, than the cause, of diminished or exhausted febrile commotion. The object, therefore, should be, first to lessen the excitement by depletion, alvine evacuations, and sedatives; and then to make choice of those diaphoretics which produce a lowering and refrigerant operation, until the strength of pulse and heat of skin are reduced. Hence the propriety of adopting the medicines already recommended, and combining them with the nitrate of potash, and with each other.

73. *c. Emetics* are amongst the most beneficial remedies we can resort to in certain states of bronchitis, particularly in the *third variety*; and, in the *second*, after blood-letting: in children they are often remarkably useful. They have the effect of unloading the bronchi of the mucus accumulated in them, of relaxing the surface, and afterwards of promoting perspiration. For children, ipecacuanha should be preferred; and for aged persons, and the third variety of the disease, the sulphate of zinc. In the second form, and in all other subjects, the tartarised antimony is the best emetic that can be prescribed, as it operates both by vomiting, by lowering vascular action, and promoting perspiration. Emetics are more particularly required when the expectoration is difficult or suppressed, the cough severe and suffocating, and when the disorder depends upon the inhalation of irritating particles. They moreover tend to promote the operation of purgatives, which are generally much required in this disease. In cases of extreme depression, with suppressed excretion of the secretion, the stimulating emetics in the Appendix (F. 402, 403.) should be selected.

74. *d. Purgatives and cathartics* have been considered by several writers as of doubtful efficacy in pulmonic inflammations; and, when expectoration is established, as being even prejudicial. Such appears also to be partly the opinion of an able reviewer in the *Medical-Chirurgical Review* for Dec. 1820. But it is not quite in accordance with my experience, which, at the Infirmary for Children alone, must have amounted to some thousand cases of the different forms of the disease. It should be kept in recollection, that the expectoration in bronchitis is not a salutary discharge from the lungs, the promotion of which is a beneficial indication of cure; but that it is the product of a morbid state, of the nature of which it is an index; that this state is generally inflammatory, and always attended with determination of the circulating fluids, thereby keeping up the discharge. It is obvious, that whatever tends to increase the morbid determination to the bronchial surface will increase the disease, and, consequently, the expectoration; and that whatever derives from this situation will proportionately diminish both. That purgatives or cathartics, judiciously combined, have the effect of deriving from the lungs, by increasing the se-

cretions of the liver and digestive mucous surface, must be evident; and I have accordingly found them serviceable when thus prescribed. Severe attacks of bronchitis, moreover, are favoured by congestions and accumulations of bile in the biliary organs, and by sordes retained on the mucous surface of the bowels. In all those cases more especially—wherein the stools are generally very offensive—and at the commencement of all the forms of the disease, these medicines ought to be exhibited, with the view not only of promoting the abdominal secretions, and of removing fecal matters and sordes, but also of deriving the circulation from the seat of disease; and the bowels should be kept very freely open throughout the treatment. It is, of course, understood that we are not to prescribe cathartics to the extent of depressing the energies of the frame too low, especially when they are already weak. Indeed, purgatives may be as much required, and as beneficially employed, in asthenic cases, as in others of a more phlogistic description, particularly if the bowels have been neglected; effects of a very different nature from that of mere evacuation arising from a judicious choice and combination of them. Thus, when prescribed with bitters, tonics, stimulants, or antispasmodics (F. 266. 471. 572. 880, 881. 887.), in the asthenic or suffocative states of the disease, not only will full alvine evacuations be procured, but also a tonic effect on the digestive organs; and, consecutively, a more moderate secretion in the bronchi, with an easier expectoration, will be produced. I have observed that the combination of purgatives, especially calomel, or those of the resinous class, with camphor, antimony, and hyoscyamus, according to the circumstances of the case, is particularly serviceable in bronchial diseases.

75. *e. Expectorants* have been much abused in inflammations of the bronchi; chiefly from the circumstance of the expectoration being too generally viewed as a salutary discharge which ought to be promoted, instead of its being a product of the inflammatory state, or of active determination to the surface of the air-vessels. I consider them quite inadmissible when there is much fever or heat of skin, or when the sputum is abundant and fluid, the patient having sufficient strength to bring it up; and generally in the second variety of the disease. On the other hand, in the third variety, or when the expectoration is arrested evidently from want of power to throw it off, or so excrete it, or from its great viscosity, expectorants will be of much service. In such cases, *ammonia* and *camphor* should be first tried, as being generally least detrimental in doubtful cases, and most quickly beneficial. Where the admissibility of expectorants is evident, especially in the asthenic form of the disease, and in aged persons, *squills*, *ammoniacum*, *galbanum*, or *senega*, may be directed; with the precautions, and in the forms, recommended when treating of them with reference to humoral asthma. (See ASTHMA, § 89. 103.; and B. No. 41—46.) When expectoration is rendered difficult, and the cough suffocative, from the tenacity and consistence of the sputum, as is sometimes the case, *attenuants* and *alteratives*, as the fixed alkalies combined with *ipeacacuanha*, &c., or as prescribed in the article on ASTHMA (§ 103. B. No. 50, 51.), and exhibited with camphor or ammonia, will be found of much service. In

nearly all states of bronchitis, *camphor* is a most valuable medicine. Its virtues have been singularly overlooked by the writers on this disease; but, when combined with *colchicum*, or with antimony, nitrate of potash, *ipeacacuanha*, &c., and given in small doses, in the more inflammatory and febrile states of the disease; or when prescribed in progressively larger quantities, with *diuretics*, the spirit. ather. nit., opium, &c., as the vascular excitement subsides, and febrile heat disappears; and in large doses (from five to ten grains), with ammonia, ammoniacum, *senega*, opium, &c., when exhaustion and difficulty of expectoration from deficient power are urgent; it is one of the most valuable remedies we possess in this, as well as in several other diseases.

76. *f. The inhalation of emollient and medicated vapours* are occasionally of much benefit in the sthenic form of the disease, but chiefly in its first and second stages. The vapour arising from a decoction of marsh mallows, or from linseed tea, or from simple warm water, is the best suited to this state; and should be employed from time to time, the temperature of the apartment being duly regulated through the treatment, and constantly preserved from about 66° of Fahr. to 75°. Dr. PARIS recommends, during the dry easterly winds of spring (when the disease is so prevalent), the vapour of warm water to be diffused in the patient's apartment. In the early stage it may be of advantage. In the case of the son of an eminent medical writer, attended by Dr. GORDON, Mr. ANNISLEY, and myself, this was tried in the state of the air alluded to, but with no benefit. The case terminated fatally, from extension of the disease to the air-cells and substance of the lungs. When the expectoration becomes whitish, opaque, and thick, the vapour may be rendered somewhat more resolvent by adding a solution of camphor in vinegar, and extract of conium or hyoscyamus to the hot water, or to the emollient infusions now mentioned; and in the asthenic variety, particularly when the difficulty of expectoration, and the fits of dyspnoea, are distressing, or when the excretion of the morbid matter is impeded or suppressed from want of power, the medicated vapours and gases recommended in the chronic state of the disease (§ 98.), and in humoral ASTHMA (§ 88.) may be tried.

77. *g. There are various medicines which are occasionally useful, when exhibited in appropriate states and periods of the disease. Amongst these, narcotics and sedatives deserve an especial notice. Opium* should not be exhibited alone, as long as febrile action is great; but, in combination with antimony, or *ipeacacuanha*, and nitre, it is often a most valuable medicine. It is best given in small or moderate doses, in conjunction with camphor and expectorants, where vital power is reduced and expectoration difficult (§ 37.). In general, when the skin becomes cool, the bowels are well evacuated, and the air-tubes remain irritable, opium, or some other narcotic or anodyne, is indispensable. Opium, and others of this class of medicines, particularly when judiciously prescribed, are then of service, not only in diminishing the irritability of the system and of the air-passages, and in lessening the cough, the frequency or severity of which often aggravates the inflammatory irritation of, and determination to, the bronchial surface, but also in equalising the circulation, in determining to

the skin, and promoting perspiration. In the more phlogistic states of the disease, and at its commencement, *colchicum* or *digitalis* will be often of advantage, in diminishing vascular action, local determination, and morbid irritability. They ought, however, seldom to be used at the same time. In the more sthenic cases, *digitalis* is very beneficially associated with the preparations of antimony. When the sputum is thick and opaque, *colchicum* is generally less beneficial than at an earlier period, excepting in conjunction with diuretics and camphor. When the skin has become cool, it is no longer of use. In the third variety, it is seldom indicated, unless at the commencement of the disease, or when combined with ammonia and camphor. Upon the whole, both *colchicum* and *digitalis* are less to be depended upon in acute bronchitis, than a judicious combination of antimonials with anodynes, &c. *Hyoscyamus*, *conium*, and the extracts of *poppy* and of *lettuce*, are also very generally serviceable in the different forms of bronchitis. But with them, likewise, the amount of advantage will entirely depend upon the manner in which they are prescribed. In the sthenic and febrile states of the disease, and at its commencement, they should be associated with antimonials, ipecacuanha, refrigerants, demulcents, and emollients (F. 24. 208. 427. 554.); with diaphoretics (F. 394. 568. 809.); and with diuretics (F. 818. 865. 893.); or in other similar forms, of which there are several in the Appendix. When the disorder assumes an asthenic state, or when expectoration is difficult, the cough distressing, and the skin cool, any of the sedatives particularised may be conjoined with either ammonia, camphor, or the fixed alkalies, or with other attenuants (F. 835.), and with expectorants, &c. (F. 356. 555. 558. 811. 895.) according to circumstances.

78. *h.* When the acute form of the complaint seems to be about lapsing into the chronic, the combination of *gentle tonics* with emollients and diaphoretics is often of service, as was first pointed out by M. BROUSSAIS, who allowed also red wines much diluted with water in this state. The infusion or decoction of cinchona, or the infusion of *uva ursi*, may be thus prescribed:—

No. 69. R. Decocti vel Infusio Cinchonæ ʒiijss.; Liq. Ammon. Acet. ʒjss.; Mucilag. Acaciæ ʒss.; Spirit. Æther. Nit. ʒijss.; Tinct. Camphoræ Comp. ʒss.; Extr. Conii gr. xx.; Syrup Tolutan. ʒss. M. Capiat Cochleare unum amplum secundâ vel tertiâ quâque horâ, vel Coch. ij. quintis vel sextis horis.

79. *i.* *External measures* ought not to be overlooked during the course of the disease. In respect of *local* or *general depletions* nothing need be added to what has been already stated. The former of these should always be preferred when doubts are entertained as to the propriety of taking any considerable quantity of blood; and, in the sthenic form of the disease, may be resorted to at an advanced stage, particularly when the change in the expectoration, and other symptoms (§ 35.), indicate a return or exacerbation of the inflammatory action. *Blisters* are not admissible in the early stages of sthenic bronchitis. But, in the asthenic disease, or when inflammatory action and febrile heat have been subdued by depletions, &c., blisters are of much service, and may be applied either between the shoulders or on the breast; and, in some severe cases, re-applied or kept discharging for some time. In young children, and in adult or aged persons,

when the secretion of the bronchial surface is profuse, and the powers of life much exhausted, I have derived more permanent advantage from the use of the rubefacient *liniments* in the Appendix (F. 295. 296. 311.), rubbed assiduously twice a day over the chest or back, than from blisters. When blisters are employed, much benefit will sometimes arise from removing them as soon as slight redness of the skin is produced, and covering the part with a large warm bread and water poultice, which ought to be frequently renewed; or by applying a succession of warm fomentations. In some extreme cases of this description, I have seen much advantage derived from applying over the epigastrium and lower part of the chest, a flannel wrung out of hot water, and immediately afterwards soaked with the spir. terebinth., and allowing it to remain until severe burning heat of the skin is produced by it. If suffocation be threatened either by the profuseness of the secretion, by its difficult expectoration, or by exhaustion of the vital energy; and if we be, as we then unfortunately are, at a loss for any probable means of success; this will sometimes have a remarkable effect, and save the life of the patient, particularly when assisted by the internal use of camphor, ammonia, &c. At the time of my writing this, a case occurred, attended by Mr. Faxon and myself, where immediate relief and a speedy recovery followed this almost *dernier resort*. And I have often witnessed a similar result, in other most dangerous cases of this description, from the internal as well as the external use of this most valuable remedy, particularly at the Infirmary for Children, where I have for many years had recourse to it in cases of danger.

80. The *tepid bath*, or semicupium, will often be of service early in the disease; and in its course sponging the surface of the chest, or of the whole trunk, with warm water and vinegar, and afterwards with the warm nitromuriatic acid lotion (F. 834.), particularly towards the decline of the disease, when we dread its lapsing into the chronic, and in the asthenic variety, will often prove of essential service. The common *beverage* of the patient during the treatment should be regulated according to the state of febrile action, and its compatibility with the treatment directed. Barley water, with any of the vegetable acids, tamarind water, or any of the formulæ or drinks (vide *Potus*), contained in the Appendix, may be directed.

81. *B. Of the complicated states.*—*a.* Bronchitis is not infrequently associated, particularly at its commencement, with *sore throat*; inflammation existing not only in the *fauces*, but extending to the *pharynx*, and through the larynx down the trachea and bronchi. This state of disorder sometimes obtains in *scarlet fever*, forming a complication of remarkable danger. I have also observed it, in a very severe form, affect six members of one family, and three of another, both living in the vicinity of the metropolis, in a low damp situation, all of whom had long previously had *scarlatina*. In some of these cases the danger was great, and all were severe and of the asthenic type. Purgatives, first consisting of calomel and James's powder, and subsequently combined with stimulants and tonics, were actively exhibited. Demulcent linctures (see *Linctus*, in the Appendix), or astringent, cooling, and antiseptic gargles; external revulsants, and rubefacients; the inter-

nal exhibition of camphor, combined with antimoniales, hyoscyamus, diuretics, and afterwards with ammonia, mild attenuants, expectorants, and tonics; the liquor ammonia acetatis, with infus. cinchonæ, spirit. æther. nit., or spirit. ammon. arom., &c., formed also the chief means of cure. All the cases terminated favourably.

82. *b.* When the disease is complicated with scarlet fever, the treatment will altogether depend upon the character of the prevailing epidemic, and the circumstances of the case. Early in the complication, local depletions are sometimes required; and afterwards, full doses of camphor or ammonia, or of both, — particularly if the eruption prematurely disappear, or present a dark tint, or if the anginous affection assume an ash-colour, or a dark red, or brownish hue, — are amongst the chief remedies to be depended on. I have met with severe cases in which the bronchial disease either preceded, or followed, the efflorescence and decline of the eruption in scarlet fever; and in the course of this association most violent cerebral symptoms have supervened; thus forming a double complication. These cases, although extremely dangerous, are not necessarily fatal. Local depletion, sometimes to a very considerable extent, may be practised, chiefly by leeches applied over the sternum, behind the ears, or below the occiput, or by cupping on the nape of the neck; and calomel, antimony, revulsants, purgatives, camphor, ammonia, &c., according to the circumstances of the case, should be prescribed. Counter-irritation by rubefacient liniments is particularly required in complications of the disease with scarlatina or measles. Formulæ No. 299. and 300. may be used for this purpose, or the following: —

No. 70. R Camphoræ ʒj; Pulv. Capsici ʒss; Olei Macis ʒi xxx; Olei Olivæ ʒjss; Liq. Ammon. ʒvj. Misc. Fiat Linimentum.

83. *c.* The appearance of the disease with measles, either previous to, in the course of, or subsequently to, the eruption; or even its accession during convalescence, is a very frequent occurrence. This association was very common in the winter and spring seasons of 1829, 1830, 1831, and 1832; during which epoch, blood-letting was not so generally indicated, nor so well borne, as in former years, the bronchial affection being more frequently of the asthenic type. In general, however, local depletions are required early in the disease, and, in some cases, may be carried to a considerable extent; often much further than in its association with scarlatina. I have sometimes found it necessary to deplete locally in both these states of complication, at the very time when I judged it proper to exhibit camphor or ammonia in considerable doses. But in many instances, particularly during the years above specified, patients have recovered as readily when no sanguineous depletion has been employed, as where it has. Bronchitis occurring either in the course of scarlatina, measles, or small pox, requires active counter-irritation and revulsion; and the means recommended for this purpose (§ 79.) to be decidedly enforced. The observations I have already made respecting the use of inhalation (§ 76.) also apply to such cases. When these exanthemata commence with bronchial symptoms, *emetics* are then of decided advantage. And, if they be accompanied with sore throat,

purgatives ought to be given in decided doses, the bowels freely acted upon throughout, and enemata occasionally thrown up, particularly F. 140. 149. 794.

84. *d.* When bronchitis occurs in the course of continued fevers, the same general principles of treatment are required, as have been specified in respect of scarlatina and measles. In all these states of complication, this disease should be viewed as a marked manifestation, in a particular organ, of the morbid state prevailing more or less throughout the frame; and it should be kept in recollection, that this affection always, in some measure, impedes the changes effected by respiration on the blood, thereby increasing the morbid condition of this fluid existing more or less in all severe cases of exanthematous fevers, and at least the disposition to it that obtains even in simple continued fever. The extent to which depletion should be carried in this complication, or the propriety of employing it at all must depend upon the character of the fever, of the prevailing epidemics, and the particular symptoms and circumstances of the case. I have seen a strong, and regular-living man, with fever thus complicated, very dangerously depressed by a single small depletion. Purgatives are, however, better borne, particularly when combined with camphor or ammonia; and occasional large doses of calomel combined with camphor, and followed in a few hours by a cathartic draught, will be found of much service in promoting the functions of the liver, and enabling it to remove those elements from the blood, which so readily accumulate in it to a hurtful extent, when their elimination by the lungs is impeded. Much advantage will also arise from the use of blisters applied for a few hours, and often repeated; from the use of the rubefacient liniments above specified; and from the inhalation of the vapour of warm water, with a solution of camphor in vinegar added to it.

85. *d.* The association of the sthenic form of bronchitis with tracheitis and laryngitis, either affection preceding the other, requires full depletion, general or local, or both; large and repeated doses of calomel, with antimony; the tepid or warm bath, semicupium; internal and external revulsion, by cathartics, purgative enemata, &c.; emetics, particularly when the paroxysms of suffocation and stridulous respiration are urgent; the inhalation of watery, emollient, and anodyne vapours; and a free use of diluents, emollients, &c., with the sub-carbonate of soda, the sulphuret of potash, small doses of the sulphuret of ammonia, or of the sulphuret of copper, in extreme cases, until nausea or vomiting is occasioned, &c. Blisters are seldom of much service in this state of disease, particularly whilst the symptoms of croup are present. They ought never to be applied over the throat, as occasionally directed, and, in some cases, not without mischief; although recovery has taken place in others, notwithstanding the risk they occasioned of increasing the local irritation.

86. *e.* One of the most frequent complications presented to us in practice is that of bronchitis with *hooping cough*. In some cases, this complication commences with the usual symptoms of catarrh, on which those of bronchitis supervene; the characteristic signs of hooping cough, particularly the convulsive fits of coughing, with the

inspiratory whoop, and vomitings, not appearing for some days subsequently. In other cases—and those, perhaps the most numerous,—the inflammatory affection has not appeared until after the invasion of pertussis. When thus associated, bronchitis may be either sthenic or asthenic; the one or the other being more generally prevalent in some seasons than in others. During the years specified above (§ 83.), the asthenic state was most common; and I have seen several cases in which sanguineous depletion had been injudiciously practised, particularly as respects quantity. Cerebral symptoms are apt to occur during this complication, and also infiltration or hepatisation of a part of the substance of the lungs. These unfavourable terminations should be anticipated and prevented by small local depletions,—by leeches applied behind the ears; by the exhibition of camphor combined with ipecacuanha or antimonials, and narcotics, particularly conium or hyoscyamus; by diaphoretics with diuretics; and more especially by the use of the liniments and revulsants already recommended (§ 79.). (See HOORING COUGH.)

87. *f.* The simultaneous occurrence of inflammatory action in both the digestive and respiratory mucous surfaces is not infrequent, particularly in children; and means calculated to benefit the one, generally aggravates the other, or risks the accession of cerebral disease. I have found small local depletions, followed by the pulv. ipecacuanha comp., combined with small doses of calomel, or hydrarg. cum creta and camphor; the warm bath and frictions, with the stimulating liniments already specified (§ 79.); the application of blisters for a few hours only, and often repeated; the liq. ammoniæ acet., with spirit. ather. nit., camphor mixture, diuretics, &c., constitute the principal means of cure.

88. *g.* The association of hepatic disorder with bronchitis is not rare. But the affection of the biliary organs does not always precede the bronchial disease: it often occurs in its progress; an increased, as well as a morbid, secretion of bile supervening, probably in consequence of the vicarious increase of function of the liver, and its irritation by, and elimination of, the morbid elements accumulated in the blood owing to the impeded function of the lungs. This complication requires the use of mercurial purges combined with camphor and antimony, particularly James's or kermes powder (F. 637.); external irritants and revulsants, cathartic enemata (F. 151.), &c. A similar treatment is indicated when the disease is connected with the translation of erysipelas, gout, or rheumatism.

89. *h.* If the inflammation extend to the substance of the lungs or pleura, the antiphlogistic treatment should be rigorously enforced: the solution of tartarised antimony ought to be given in frequent doses, and carried as far as circumstances will permit; internal and external revulsants resorted to at the same time; and diaphoretics and diuretics suited to individual cases prescribed. In some instances, either colchicum or digitalis, or both, may be substituted for the antimony; but they answer better, particularly the digitalis, after this medicine has previously been used. If we have reason to suppose that effusion of serum has taken place in the thoracic cavities, diuretics, and, amongst others, digitalis, should be employed; re-

collecting, however, that the accumulative and sinking effects of either digitalis or colchicum sometimes appear very rapidly, and in an alarming degree, when they are given either at the same time or after the exhibition of tartarised antimony. Disease of the brain or its membranes supervening in the course of bronchitis has been considered in the article BRAIN (§ 186.).

90. The sub-acute form of bronchitis requires in all respects the same treatment as the acute uncomplicated disease, but not carried so far; the activity of the means should have due relation to the acuteness of the attack, and the effects they produce.

91. 2d. OF CHRONIC BRONCHITIS.—M. BROUSSAIS has very justly stated the indications of cure in chronic bronchitis to be, 1st, to diminish the general excitability, and to keep the circulation quiet; 2d, to solicit the excitement and the fluids to other organs, particularly towards the skin; and, to these I would add a 3d, namely, to restore the healthy tone and functions of the bronchial surface, by means which seem to have this effect either directly or indirectly. It is obvious, however, that the accomplishment of the first and second intentions have an indirect influence in bringing about the third.

92. *a.* General blood-letting is inadmissible in this state of the disease; and even local bleedings should in many cases be employed with caution. Cupping, however, to a moderate extent, is very frequently required; and it is evidently more advantageous to repeat the operation to a small extent, than to abstract a large quantity at once. When the disease has existed long, and is attended with a copious discharge, much general debility, and absence of pain upon full inspiration, even local depletion cannot be ventured on. Next in importance to depletion is counter-irritation; and for this purpose several means are presented to us. When there is a tendency to acute action, or when the cough is at all painful, and the sputum puriform, either the tartarised antimonial ointment, or a large issue or seton in the side, is preferable; but when there is very marked relaxation of the bronchial mucous surfaces, blisters, and rubefacients, or a succession of them, seem more appropriate. I have, however, found, in a number of cases, the liniments, No. 296, 297, 311. in the Appendix, productive of much greater advantage, and more generally applicable, than either blisters or the ointments. They may be employed once or twice daily. The vapour arising from them, and diffusing itself around, has also a direct and beneficial effect, by being inhaled, upon the diseased mucous membrane. M. BROUSSAIS is very favourable to the use of *setons* and *issues*; and I have seen several instances of marked benefit from them, particularly in the obstinate state of the disease which simulates tubercular phthisis. He also recommends warm cataplasms to the chest, made rubefacient by the addition of mustard. I have seen advantage produced by warm bread and water poultices applied over blistered surfaces, and the seats of issues formed by the mezereon bark, and by the same kind of poultices, to each of which one or two table-spoonful of the nitro-muriatic lotion (F. 834.) had been added. But it is chiefly early in the chronic disease, or when it has recently passed into this state from the acute, that issues and setons prove successful. They exhaust the energies of the system too

much to be of service in the latter stages, or when the discharge from the lungs is profuse, and the vital energies much depressed.

93. *b. Expectorants* have been much employed in this state of disease; and though more appropriate in it, than in the acute, they are often hurtful from their too exciting operation on the vessels of the bronchial surface. This is especially the case with squills, ammoniacum, and senega, which ought to be used with much caution, and never whilst the sputum is purulent, and pain or soreness complained of in the chest, with fever, heat of skin, &c. The best expectorants are those which are also astringent, or at least not very heating: amongst these, the *sulphate of oxide of zinc*, with small doses of myrrh or galbanum, and extract of conium; or small doses of *sulphate of quinine*, or of the *sulphate of iron*, with *ipeacacuanha* and opium; or the *sulphuret of potash*, and the *Balsamum Sulphuris* (F. 21, 22.), are the most eligible, when the state of the expectoration, of the skin, and pulse, indicates the propriety of having recourse to tonic expectorants. *Opium* has been too much reprobated in cases of this description, as well as in acute bronchitis, owing to the dogma that it suppresses expectoration. I believe, however, that, when judiciously combined, particularly with *ipeacacuanha*, with the muriate of lime, or either of the sulphates of potash, of alumina, or of zinc; or with the nitrate of potash; with camphor, with kermes mineral, or James's powder, according to the circumstances of the case, it is a valuable medicine; and that the diminution of the expectoration produced by it, and which has been unaccountably dreaded, is, when it occurs, a consequence of its changing the morbid state of the vessels forming the excreted matter. If it be the object—as necessarily follows from the doctrine of some writers—to preserve a copious and free expectoration in this disease, how can it ever be cured? Frequently have I seen this end pursued, as if it constituted all that was required, and squills, ammoniacum, senega, &c. given accordingly; and the more abundant and easy the expectoration thereby produced, the more rapidly did the powers of life give way, or complete hectic, with all its attendants, manifest itself. The following have proved serviceable when the pulse was soft, and not remarkably frequent; the skin cool and moist; the sputum very abundant, and consisting chiefly of mucus; and the weakness and emaciation considerable:—

No. 71. Pulv. Ipeacacuanhæ gr. j.; Camphoræ rasæ gr. ss.—j.; Extr. Conii gr. iv.—vj.; Mucil. Acaciæ q. s. M. Fiat Pil. ij. ter die capienda.

No. 72. R. Zinci Sulphatis gr. vj.; Massæ Pilul. Galban. Co. 3j.; Extr. Conii 3 ss.; Syrup. q. s. M. Fiat Pilulæ xij., quarum capiat unam tertius horæ.

No. 73. R. Pulv. Ipeacacuan. Comp. gr. xxv.; Quinina Sulphatis gr. vj.; Pulv. Acaciæ 3j.; Extr. Lactucæ 3j.; Syrup. Papaveris q. s. M. Fiat Pilulæ xvij., quarum capiat binas ter quotidie.

No. 74. R. Quinina Sulphatis gr. vj.; Pulv. Ipeacacuanhæ gr. iv.; Camphoræ rasæ gr. iv.; Opj. Puri gr. vj.; Pulv. Rad. Glycyrrh. (vel Extr.) 3 ss.; Mucilag. Acaciæ q. s. Misce, benè, et fiat Pilulæ xx., quarum capiat binas ter quaterve quotidie.

No. 75. R. Balsam. Sulphuris 3ss.; Pulv. Ipeacac. gr. vj.; Extr. Conii 3ij.; Pulv. et Mucilag. Acaciæ q. s. M. Fiat, secundum artem, Pil. xx., quarum capiat binas quartâ quâque horâ.

No. 76. R. Solut. Muriatis Calcis ℥ xx.—xxxv.; Mist. Camphoræ 3 x.; Tinct. Opii Comp. (F. 729.) ℥ x.—xx.; (vel Tinct. Camphoræ Comp. 3jss.) M. Fiat Haustus ter die capendus.

94. *c.* In cases of this description, any of the

formulæ given under the head *Balsams*, in the Appendix, may be employed. Dr. ARMSTRONG strongly recommended the balsam of copaiva in chronic bronchitis; but it is seldom beneficial, and is certainly inferior to the other balsams and terebinthines in this affection (F. 486, 487, 538, 571.). In the more advanced stages of chronic bronchitis, particularly when the colliquative sweats or diarrhœa occur, the most essential benefit has been derived from the following mixture, in several cases in which I prescribed it; but even where the bowels are regular, I have found it by no means productive of costiveness. At the time that I was giving this medicine to the third patient on whom I had tried it, a case, showing the success of a nearly similar treatment, was published by Dr. HASTINGS (*Midland Med. Repor.* vol. ii. p. 376.).—a coincidence fully evincing the propriety of the practice.

No. 77. R. Mist. Crete 3vjss.; Vini Ipecac. 3jss.; Tinct. Opii 3j.; (vel Tinct. Camphoræ Comp. 3vj); Syrup. Tolutan. 3ij. M. Capiat Cochlearia duo larga ter quaterve in die.

The cretaceous mixture will often be of service when used alone, or with a little of the muriate of lime, or with the addition of mucilage, or of hyoscyamus, or conium, or extr. lactucæ, or the extr. papaveris, according to circumstances. In this state of the disease, also, I have seen *sulphur* given with advantage in mucilaginous electuaries. Dr. L. KENCKHOFFS states, that he has administered it with success, in conjunction with the powder of the white willow bark. M. BROUSSAIS relies chiefly upon *mucilages* and demulcents, combined with *ipeacacuanha* and opium, and certainly with great justice. (See F. 284, et seq.). The extr. lactucæ, as recommended by Dr. DUNCAN, may occasionally be substituted for the opium. The decoctions of *Iceland moss*, and the infusions of *conium*, of *marrubium*, of the *uva ursi*, or of the *melissa* (F. 230, 237, 238, 245, 267.), with mucilages, anodynes, and *ipeacacuanha*, are also very serviceable. I have given the preparations of *iodine* in a few cases, in small doses; and, in some instances, especially when there was little or no febrile action, nor much emaciation, benefit appeared to be derived from them.

95. *d.* When the disease is attended with dyspnoea, and profuse or difficult expectoration, *emetics* are of great, although often of temporary advantage, particularly in aged persons. *Ipeacacuanha*, or sulphate of zinc, with the addition of diffusible stimulants (F. 402.), are the most appropriate in the majority of cases. After their operation, and if the strength be not very much reduced, the *digitalis* or *colchicum* may be prescribed, in conjunction with diuretics and gentle astringents (F. 203.). These active medicines are chiefly suited to the more febrile states of the disease, or when soreness or slight pain of chest are complained of, with a puriform expectoration; and are best combined with small doses of blue pill, camphor, and opium,—with pectoral infusions and mixtures (see App. F. 244, 426, 497.) with demulcents (F. 389.), and with diuretics (F. 194, 195, 236, 237.). Dr. HASTINGS recommends a combination of *digitalis* and *colchicum*; but I have seen more harm than benefit occasioned by it in some cases of chronic bronchitis,—a result which might, *a priori*, be expected from the associated operation of two most depress-

ing medicines, given in a state of disease characterised by irritative, rather than by acute, vascular action. I have found them most beneficial when exhibited singly with diuretics, or diaphoretics, in the chronic forms of bronchitis consecutive of exanthematous fevers (§54.); sometimes resorting also to the warm bath, followed by frictions of the surface with the liniments F. 297. or 311. The combination of colchicum and digitalis, in small or moderate doses, has proved more serviceable, in my practice, in tubercular disease of the lungs, or when bronchitis has been complicated with tubercles. In cases where the propriety of giving these medicines is doubtful, a combination of them with the alkalies, or their carbonates, and with tonic infusions or decoctions, or F. 515—517., or the following, may be prescribed:—

No. 78. R. Pulv. Colchici (vel Pulv. Digitalis) gr. j.—ij.; Massæ Pilul. Hydrarg. gr. ij.; Massæ Pilul. Galban. Comp. gr. v.; Extr. Opil. gr. ss.; Syrup. q. s. M. Fiat Pil. ij. bis terve quotidie sumenda.

No. 79. R. Infus. Uvæ Ursi 3 xij.; Acid. Sulph. Dil. M. xx.; Tinct. Digitalis M. x.—xv.; Tinct. Camphoræ Comp. ʒi.; Syrup. Papaveris ʒss. M. Fiat Haustus, bis terve in die sumendus.

No. 80. R. Sodæ Sub-carbon. (vel. Liq. Potassæ) ʒj.; Infus. Calumbæ (vel Decocti Cinchonæ) 3 vj.; Tinct. Colchici Semin. ʒj.—ʒjss.; Tinct. Digitalis M. xxx. M. Capiat Coch. ij. larga ter in die.

No. 81. R. Mist. Diosmæ Crenatæ (F. 306.) 3 vss.; Tinct. Digitalis M. xxxv. (vel Tinct. Semin. Colchici ʒj.—ʒj.); Extr. Conii gr. xxvj. (vel Extr. Lactuæ ʒss.); Syrup. Tolutan. ʒss. M. Fiat Mist., cuius sumat Coch. ij. larga ter quaterve in die.

No. 82. R. Pulv. Acaciæ ʒj.; Mist. Amygdal. Dulc. et Camphoræ ʒā ʒijss.; Acid. Hydrocyanici M. vj.—xij; Spir. Æther. Sulph. Comp. ʒij.—ij.; Oxylinellus Scillæ ʒss. M. Coch. ij. vel ij. larga ter in die.

96. *Prussic acid* is often of much service in the chronic forms of bronchitis, especially in their complications with disorder of the digestive organs, and may be exhibited with demulcents, gentle tonics, astringents, or expectorants, or as prescribed in the Appendix (F. 344. 858.). When the disease is associated with derangement of the hepatic functions, or even of the stomach and bowels, it will be necessary to give small doses of blue pill, or of the hydrarg. cum creta, with deobstruents and gentle tonics; and, on some occasions, full doses of calomel from time to time, either alone, or in suitable forms of combination, followed by a purgative.

No. 83. R. Pilul. Hydrarg. gr. vj. (vel. Hydr. cum Creta gr. xvij.); Pulv. Ipecacuanhæ gr. viij.; Extr. Sarsæ et Ext. Taraxaci ʒā ʒj.; Gum. Assafœtidæ et Saponis Castil. ʒā ʒj. M. Fiat Pilulæ xlvij., quarum capiat binas ter quaterve in die.

No. 84. R. Hydrarg. Submur. gr. vj.; Kermes Mineral. gr. xij.; Camphoræ rasæ gr. xij.; Extr. Taraxaci ʒjss.; Extr. Humul. ʒjss. M. Divide in Pilulas lxiv., quarum capiat ij. vel ij. ter quaterve in die.

97. The treatment which has been already commended for *Humoral Asthma* (see particularly § 100, et *omn. seq.*), and the tonics and astringents, especially the sulphates of zinc, iron, or quinine, already noticed (§93.), are applicable, with but little variation, to the more chronic and humoral states of the disease, especially in persons advanced in life, and in children, when it has assumed a chronic form after whooping-cough and the exanthemata. I have also occasionally seen benefit derived, in these states of chronic bronchitis, from the *chlorate of potash*, given to adults, in from two to six grains, three or four times a day. This medicine was often prescribed by myself and one of my colleagues, at the Infirmary for Children, during the years 1826—1828,

and subsequently, in the more chronic forms of bronchitis, and in various disorders of debility; in which latter it was generally beneficial: but little advantage was frequently derived from it in this disease, unless in those forms of it now mentioned, where it was often of great use, particularly when the morbid action seemed connected with deficient tone of the bronchial vessels, and of the system generally. Mr. MURRAY, in a recent publication, states, that he has employed it successfully in consumption,—a name which has usually comprised most of the cases of this form of bronchitis.

98. *e. Inhalations* of medicated or tar vapours have been recommended by CRICHTON, PAGENSTIECHER, HUFELAND, FORBES, HASTINGS, ELLIOTSON, GANNAL, and others noticed in the article on *Asthma*, and been disapproved of by some. I believe that they have frequently been used in too concentrated a state; or too much of the vapour has been diffused in the respired air, occasioning irritation of the bronchial membrane, instead of a gently tonic and healing effect. Whenever any of the vapours advised in this disease produce an increase of the cough, either its use should be left off, or its strength greatly reduced. The manner of having recourse to such vapours, as well as the choice of substances emitting them, have not, in my opinion, always been judicious. The tar vapour is occasionally of service, chiefly from the quantity of turpentine it contains; while the acrid empyreumatic fumes which it also emits, counteract whatever good effect the former constituent might produce. Would it not, therefore, be preferable to try the effects of the substance from which the advantage is obviously derived? I have done so in a few cases of this disease, and seen marked benefit result from it; and therefore recommend it to the notice of other practitioners. In former times, medication by fumigations and vapours was much resorted to; and it is probable, that the early use of incense and various balsamic and aromatic fumes in religious rites had some relation to their prophylactic effect against disease, or even to their curative influence; the more especially, as the priests of antiquity also exercised the healing art. In several of the productions attributed to HIPPOCRATES, the inhalation of vapours and fumes of various resinous and balsamic substances is recommended; and a number of writers in the 16th, 17th, and 18th centuries, have advised a nearly similar method, and employed camphor, benzoin, amber, frankincense, myrrh, storax, assafœtida, sulphur, cloves, the balsams, &c. for this purpose. This practice was employed by BENEDICT (see his *Theatrum Tabidorum*) in consumptive diseases: and BOERHAAVE gives several formula, in his *Materia Medica*, for fumigations with the above substances. MEAD, in his *Monita et Precepta*, offers several judicious remarks on this subject. He observes—"that fumigations with balsamics, &c. is of vast service in some cases: which is to be done by throwing the ingredients on red coals, and receiving the fumes through a proper tube directed to the wind-pipe." After noticing the undeserved neglect of this practice, and the propriety of thus applying medicinal substances directly to the seat of disease, he states, that the smoke of the balsam of Tolu conveyed into the lungs, or the smoking this substance like tobacco, is of signal service in

diseases of this organ. (p. 58.) It appears from the writings of FRACASTORI that the fumes of *cinnabar* were much employed by inhalation in the treatment of the constitutional forms of syphilis, at an early period of the history of that disease, when it assumed a pestilential form.

99. Notwithstanding the unsuccessful attempts of BEDDOES to revive the practice, by employing the elementary and permanently elastic gases, but according to views too exclusively chemical, the practice of inhalation has long been neglected, or undeservedly fallen into the hands of empirics. Very recently, however, it has been brought again into notice by M. GANNAL, Mr. MURRAY, and Sir C. SCUDAMORE; and *chlorine gas*, the fumes of *iodine*, and watery vapour holding in solution various *narcotics*, have been recommended to be inhaled. I have tried those substances in a few cases of chronic bronchitis; but in not more than two or three cases of tubercular phthisis. The chlorine was used in so diluted a state as not to excite irritation or cough. The sulphuret of iodine, and the *liquor hydriodatis potasse concentratus* (F. 328.) were also employed; one or two drachms of the latter being added to about a pint of water at the temperature of 130°, and the fumes inhaled for ten or twelve minutes, twice or thrice daily. The tinctures or extracts of hyoscyamus and conium, with camphor, added to water at about the above temperature, were likewise made trial of; and, although the cases have been few in which these substances have been thus used by me, yet sufficient evidence of advantage has been furnished to warrant the recommendation of them in this state of the disease.

100. *Inhalations* also of the fumes of the *balsams*, of the *terebinthinates*, of the odoriferous *resins*, &c. are evidently, from what I have seen of their effects, of much service in the chronic forms of bronchitis; and I believe that they have fallen into disuse, from having been inhaled as they arise in a column or current from the substances yielding them, and before they have been sufficiently diffused in the air. When thus employed, they not only occasion too great excitement of the bronchial surface, but also intercept an equal portion of respirable air, and thereby interfere with the already sufficiently impeded function of respiration. M. NYSSEN has shown (*Dict. des Scien. Méd.* t. xvii. p. 143.) that ammoniacal and other stimulating fumes, when inhaled into the lungs in too concentrated a state, produce most acute inflammation of the air-tubes, generally terminating in death; and refers to a case in which he observed this result from an incautious trial of this practice. I conceive, therefore, that the vapours emitted by the more fluid balsams, terebinthates, the resins, camphor, vinegar, &c., and from chlorine and the preparations of iodine, should be more diluted by admixture with the atmosphere, previously to being inhaled, than they usually are. According to this view, I have directed them to be diffused in the air of the patient's apartment, regulating the quantity of the fumes, the continuance of the process, and the frequency of its repetition, by the effects produced on the cough, on the quantity and state of the sputa, and on the respiration. The objects had in view have been gradually to diminish the quantity of the sputum, by changing

the action of the vessels secreting it; without exciting cough, or increasing the tightness of the chest, or otherwise disordering respiration. From this it will appear, that the prolonged respiration of air containing a weak dose of medicated fumes or vapours, is to be preferred to a short inhalation of them in their more concentrated states. The want of success which Dr. HASTINGS and others have experienced, evidently has been partly owing to the mode of administering them, and partly to having prescribed them inappropriately. When the patient complains of acute pain in any part of the chest, as in some of Dr. HASTINGS's cases, they are as likely to be mischievous as beneficial. Where benefit has been obtained, it will be found that it was when the fumes of the more stimulating of those substances were diffused, in moderate quantity, in the air of the patient's apartments; or when he passed, at several periods daily, some time in a room moderately charged with the vapour or fumes of the substance or substances selected for use. (See the remarks on *Inhalation in Humoral Asthma*, § 88. for an account of various medicines that may be employed in this manner.)

101. *f. Sponging the surface of the chest*, and trunk of the body, first with tepid, and afterwards with cold lotion, has often been practised by me with advantage in several states of this disease. When the expectoration has been profuse, the debility great, and little or no febrile heat present, I have preferred for this purpose the nitromuriatic acid lotion (F. 834.), in a warm or tepid state, night or morning, or both. When the disease is more active, the habit of body being, nevertheless, relaxed and debilitated, a solution of common salt in water, or the lotion, R 54., seems preferable; and the directions given respecting this treatment in the article *Asthma* (§ 116, 117.) should be strictly followed. I have observed much benefit derived from the application, for a considerable time, of one of the plasters, F. 111. 115. 118. 119., between the shoulders; whilst cold sponging the anterior of the trunk with the lotions referred to has also been directed.

102. *g. The complications of chronic bronchitis* require generally no particular modification of treatment from that now detailed: indeed, some of them have been already noticed. I may, however, add, that, in the chronic asthenic states of the disease frequently met with in aged persons, and often occurring in children after exanthematic diseases, whooping-cough, and bowel complaints, the flowers of sulphur, the preparations of zinc, the oxide of bismuth, and the chlorates of potash and of lime, have severally been of great service, especially when combined with narcotics — with opium in the aged, and conium in the young, — their constipating effects upon the bowels being daily obviated by the occasional exhibition of purgatives. The chronic bronchitis complicated with, or consecutive of, whooping-cough, the characteristic cough of the latter either still continuing, or having altogether disappeared, is frequently attended with *dilatation* of the bronchi. In these cases, balsams, inhalation, the use of tonics, particularly the sulphate of iron, quinine, the liniments already noticed, frequent doses of sulphur, or moderate doses of

the chlorate of potash, are required. If the child be not very young, either of these latter may be combined with belladonna, or with conium, and given in honey or syrup of squills; or with simple syrup, sugar, powdered liquorice root, or with the compound tragacanth powder. When the disease is associated with chronic irritation of the mucous surface of the bowels, the chlorate of lime will be of much service, and will soon restrain the latter affection; the use of the *liniments* already recommended (F. 296, 311.), in addition, generally contributing to cure the bronchial disease. Either of these liniments has often been sufficient of itself to remove all disorder, both in the consecutive states, and in the different complications noticed at this place; and, when bronchitis seems to have a tendency to terminate, or has actually terminated, in effusion, they have powerfully assisted the treatment. When, however, dropsies supervene, in addition to them, colicium or digitalis, with astringent tonics; squills, with blue pill, tarraxacum, or extract of sarsaparilla; the preparations of *iodine*, alone or with narcotics; super-tartrate of potash, with the sub-borate of soda, particularly this last; and various other diuretic and deobstruent medicines in different forms of combination — of which numerous examples are given in the *Appendix* — and the general plan of treatment recommended in the article *DIURSY*; should be employed.

103. *C. The regimenal treatment of bronchitis* requires strict attention. — *a.* In the *sthenic acute* disease it should be strictly antiphlogistic; and, at the commencement of convalescence, a farinaceous diet adopted, until out-of-door exercise may be taken, or shortly before. In the *asthenic states* of acute bronchitis, this regimen is chiefly applicable to the commencement of the disease: subsequently, nourishment in small quantities, suited, in kind and frequency of partaking of it, to the state of the symptoms, the powers of the digestive organs, and feelings of the patient, should be permitted; and even animal food of a digestible nature, in moderate quantity, may in some cases, particularly in the aged, be permitted once a day. The decoction of Iceland moss, jellies, mucilaginous and emollient soups; shell-fish; the different kinds of white fish, dressed either with sweet oil or the oil obtained by boiling their fresh livers; the lighter kinds of animal food; and, in the case of infants, attention to the milk of the mother, or a healthy wet-nurse; are all occasionally of service during early convalescence from the *acute* forms of bronchitis, and in the progress of the more febrile states of the *chronic* disease. In the more *asthenic* cases of this latter, or when the expectoration is profuse, the skin cool and moist, and the habit of body lymphatic, relaxed, or wasted, animal food, especially fresh beef or mutton, underdone, and in moderate quantity; new-laid raw eggs; or a due proportion of digestible and stimulating food; will be found most serviceable. In nearly all the *chronic* states of the disease, particularly in their advanced stages, a light nutritious diet is necessary.

104. *b.* The patient's *beverage* should receive particular attention. Lemonade, imperial, barley-water, and the cooling and aperient drinks prescribed in the *Appendix* (F. 588—596, 916.), should be employed in the *sthenic* form of the acute disease. In the *asthenic* and *chronic* states,

the red Bordeaux wines, or the wines of Burgundy — the former generally reduced by one third or one half water; or beer or ale, also reduced, to which a little of the liquor potassæ, or of Brandish's alkaline solution, has been added, may also be tried at meals; and either of these, or of the more cooling beverages, adopted, that may be found to agree best with the patient. If the disease evince a disposition to terminate in dropsy, the imperial drink, with the addition of a little borax, or F. 590, 591., will be most serviceable. In the advanced period of *chronic*, or during convalescence from *acute*, bronchitis, the sulphureous mineral waters will often be beneficial. Those of Harrowgate, Leamington, or Moffat, may be tried; or of Enghein, Bonnes, Barèges, or Cauterets (Роснь); or the artificial waters of Ems or Carlsbad.

105. *c.* Few diseases are more benefited than chronic bronchitis by *change of air*. A residence on the southern coast, particularly at Torquay, and in various other parts of Devonshire, during the winter and spring months, guarding against vicissitudes of climate, — which, however, is milder and less variable in this part of the island than any where else; wearing flannel next the skin, especially during winter and spring; gentle exercise on horseback, or the use of the swing; and constant attention to the state of the bowels; are severally of great importance. During the progress of convalescence, as well as in the earlier stages of disease, particularly if the secretion from the bronchi continue, it will be necessary to resort occasionally to an emetic; and in a day or two subsequently, notwithstanding the bowels may be freely open, to an active cathartic. In these cases, the addition of a vegetable bitter or tonic to a purgative medicine, — as the sulphate of quinine to aloes, or the infusion or extract of gentian to senna, — will have a decidedly cathartic operation, without lowering the energies of the frame. There are few diseases more benefited, either in their progress or decline, than those now discussed, by active purging; but it will often be requisite to combine the purgatives with stimulants or tonics, in order that an active or continued operation on the bowels may not exhaust the patient. During convalescence, the free use of purgatives requires a liberal and invigorating diet.

106. *V. DILATATION OF THE BRONCHII.* — The *anatomical characters* and *physical signs* of this change of the bronchi have been already described (§ 19.). It is almost entirely a consequence of, or an attendant upon, the more chronic cases of bronchitis, or of hooping-cough complicated with bronchitis. The expectoration, besides being copious and puriform, is often fetid, — a diagnostic symptom of this alteration, without which, M. Louis, and other pathologists, who have devoted much attention to pulmonary diseases, have sometimes failed of distinguishing it from phthisis.

107. The *TREATMENT* of this alteration is nearly the same as that which has been recommended in the more chronic states of bronchitis. The means which are especially indicated consist of the *inhalation* of balsamic and terebinthinate fumes; of those of chlorine, iodine, &c. (§ 99, 100.); the internal use of balsams, tonics, and bitters, particularly the sulphates of quinine, or of zinc, or iron;

and other preparations of cinchona or steel; with the use of the liniments already noticed (§ 102.); or the nitro-muriatic lotion on the chest. The chlorate of potash, or of lime, seems indicated in this form of the disease. An open state of the bowels, an occasional cathartic, nutritious diet, and change of air, are also evidently required. In other respects, the treatment already detailed (§ 101, *et seq.*) may be followed; or modified according to the peculiarities of the case.

108. VI. ULCERATION OF THE BRONCHI (see § 7, 8.) is another alteration which is produced by, or is attendant on the advanced stages of, chronic bronchitis; most frequently, however, when complicated with tubercular phthisis. It is not infrequently met with, particularly after bronchitis occasioned by the mechanical irritation of mineral, vegetable, or animal molecules. The existence of ulceration, when seated in the bronchi, is not indicated by any sign in addition to those which accompany the most chronic states of bronchitis, or tubercular disease, when it arises from, or is complicated with, this change. When affecting the LARYNX or TRACHEA (see these articles), it may frequently be suspected, or occasionally prognosticated. In a case which occurred in the trachea, a prognosis to this effect was given by me long before death.

109. The TREATMENT of this lesion, even could its existence be ascertained during life, cannot be different from that required in some other states of chronic bronchitis. That ulceration may take place in the bronchi, and heal, as evinced by the appearance of cicatrices, has been ascertained by M. LAENNEC, and other pathologists. In addition to the means of cure already described, the establishment of local drains of the most active kind is obviously required. Blisters and issues applied to a distant part have not been found of use by M. LAENNEC. He prefers the repeated application of small moxas as near the seat of disease as possible, and the preservation of absolute rest and silence. The inhalation of emollient, anodyne and balsamic vapours and fumes may likewise be tried; and, if the disease be devoid of marked febrile excitement, the expectoration abundant, and the powers of life consequently reduced, the treatment advised for dilatation of the bronchi (§ 19.) may be employed in all its parts. (For the treatment of other organic changes of the air-passages, see *ARTS. CHRON. LARYNX, LUNGS — Hemorrhage from, and TRACHEA.*)

VII. BRONCHIAL FLUX. — *Bronchorrhœa* (from *ῥοις* and *ῥεω*.) SYN. *Bronchorrhœe* (Roche). *Catarrhe Pituiteux* (Laennec). *Mucous Flux*.

CLASSIF. I. CLASS, III. ORDER (Author).

110. DEFIN. *A flux of watery mucus, or phlegm, from the chest, with more or less cough, but without fever; frequently occasioning exhaustion.*

111. This affection varies considerably. It is often a variety of chronic bronchitis; being consecutive of it in persons advanced in life, or those of a relaxed and phlegmatic or pituitous habit of body. In other cases it appears from the commencement, or consecutively of slight catarrh, as intermediate between chronic bronchitis and humoral asthma. This appellation may, upon the whole, therefore, be viewed as applicable to those cases which are attended with a more

abundant, fluid, and transparent expectoration, than is observed in chronic bronchitis, and are devoid of fever and all other signs of inflammatory action; whilst they are equally without the severe dyspnoea, the paroxysms of suffocation and cough, and the intermissions, characterising humid asthma.

112. *Bronchorrhœa* proceeds generally from similar causes to those which produce common catarrh, or bronchitis, even although it be not consecutive of some one of the forms of bronchial inflammation. It is very frequently, either at its commencement, or recurrence, connected with cold and moist states of the atmosphere, or occasioned by exposure to cold in some one or other of its forms. When it occurs as a sequela of bronchitis, it may be viewed as arising from lost tone of the vessels and of the bronchial surface, the flux or determination to this part still continuing, from peculiarity of habit or some other cause, after all inflammatory and febrile symptoms have been removed. Thus it is very frequent in aged persons of relaxed fibres, who have experienced repeated attacks of pulmonary catarrh.

113. *Diagnostic symptoms.* — *Bronchorrhœa* may be distinguished from chronic bronchitis, tubercular phthisis, and humoral asthma, by the following characters: — The quantity of fluid expectorated is very great; being, in some cases, as much as four or five pounds in the twenty-four hours. The sputum is colourless, ropy, transparent, slightly frothy on the surface, and resembling the white of egg mixed with water. It is without the thickened sputa generally accompanying chronic bronchitis. There is considerable dyspnoea, but the chest sounds well throughout upon percussion; and the cough is slight comparatively to the quantity of the expectoration, being evidently no more than is occasioned by the discharge of the secreted fluid. The pulse and temperature of the skin are natural, and there are no night sweats. The appetite is generally unimpaired; and emaciation is not remarkable, or not at all observed, unless the quantity of the sputum be extremely great. M. NAUCHE states, that the expectoration in this state of disease is always more or less acid, and reddens turnsole paper, whilst that proceeding from inflammatory action restores the blue tint to this paper after being reddened by acids. On auscultation, the respiratory murmur is commonly weak, but is very rarely suspended. The sibilous rhonchus is heard more or less distinctly, and often mixed with the sonorous, and occasionally with the mucous rhonchus, the bubbles of which seem to burst upon the surface of a fluid of less consistence than in bronchitis.

114. *Bronchorrhœa* usually commences with catarrhal symptoms, and frequently without fever. In other cases, after bronchitis has continued chronic for a longer or shorter period, the expectoration becomes less consistent and less opaque, more abundant, and similar to that described; and the affection becomes established, — aggravated at times by disorder of the stomach or bowels, or by changes of the air, especially by cold and moisture, or by arrest of the cutaneous transpiration from any cause, — and ameliorated at other times by a warm dry air, an open state of the bowels, and light nourishing diet, taken in

moderate quantity. Vacillating in this manner, the disease may continue for years if it be not severe, without materially affecting the strength. But more frequently the discharge increases, after irregularly prolonged, and more or less slight intervals; the patient loses his flesh, and becomes paler; his strength is impaired; dyspnoea increases; and, in some cases, the affection either runs into humoral asthma, or the quantity of expectoration is augmented so as to exhaust his energies, and to occasion suffocating paroxysms of cough. In rarer cases, the quantity of the bronchial discharge has been so great as to occasion the exhaustion and death of the patient. M. ANDRAL has detailed two cases of this description, wherein, upon dissection, no evidence of inflammation or congestion could be found in the air-tubes. M. ROCHE has described, what he has designated an acute form of this affection, which other French pathologists have named *catarrhe suffocant*; but it differs in no respects from the more humoral states of asthma, described in its more appropriate place, and presenting all the symptoms of spasm of the air-passages, with a copious viscid expectoration; the spasm and other symptoms subsiding after the bronchi and trachea are unloaded of the secretion accumulated in them. Bronchorrhoea has, in rare instances, been the means of removing other diseases. M. ANDRAL states that he has seen hydrothorax disappear after the establishment of a copious bronchial flux.

115. TREATMENT. — After the full exposition that has been given of the means of cure in the different states of chronic bronchitis, to some of which bronchorrhoea is closely allied, it will be sufficient to enumerate succinctly the various means which are applicable to this affection. As the disease essentially consists of an increased secretion and exhalation from the respiratory mucous membrane, with a determination of the circulation to that quarter, and deficient tone of the vessels distributed to it, the obvious indications are, to increase the secretions from other surfaces and organs, thereby to derive from the lungs, and to restore the lost tone of this membrane and its vessels. In some cases, accordingly, it will be advantageous to commence with an ipecacuanha or sulphate of zinc *emetic*, and afterwards to act freely upon the secretions and alvine excretions by purgatives. I have never seen a case of the disease which has not been much relieved by purgatives; taking care, however, that they should not lower the energies of the constitution, by combining them with tonics, bitters, or stimulants, and allowing sufficient light nourishment to admit of this mode of derivation being satisfactorily employed. In the intervals between the exhibition of purgatives, diuretics and diaphoretics may be exhibited, and the cutaneous functions promoted by wearing flannel next the skin during the winter and spring months.

116. *Expectorants* are very much employed in this affection; but some of this class of medicines are seldom of benefit in it, unless combined with opium. The *balsams* and *terebinthinates* (F. 484—487. 489.); the sulphate of zinc, with myrrh, or the compound gallanum pill; and either of these, with camphor and opium; are often of service. In addition to these, *inhalations*,

as recommended in another part (§ 99, 100.), may be employed. Although astringents and inhalations are often required, yet we should be cautious in using them when the disease has been of very long continuance, particularly in persons advanced in age, or when there is any irregularity of the action of the heart, or physical sign of organic change about this organ, complicated with it; inasmuch as the arrest of an habitual discharge will, in such circumstances, risk the supervention of effusion in the cavities of the thorax. It will be more judicious, in these cases, to confide in purgatives combined with bitter tonics; in diuretics, and in diaphoretics, so as to moderate the discharge, and prevent its increase, or its exhausting effects upon the system. At the same time the vital energies should be promoted by a light nutritious diet, moderate exercise, and change of air, with the sulphureous or gently tonic mineral waters. In other cases, where the age of the patient, the regular or healthy state of the heart's action, the absence of leucophlegmasia, and the circumstances of the case altogether, are such as to preclude dread of the consequences of suppressing this discharge, cold sponging the surface of the body by the nitro-muriatic lotion, &c. (§ 101.), and the liniments already noticed (F. 296. 311.), with the internal use of the more astringent tonics, particularly the sulphates of iron or of quinine, in addition to the measures already recommended, may also be practised.

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BRONCHIOCELE (from *Βρόγχος*, throat, and *κῆλη*, a swelling). *SYN.* *Hernia Gutturalis*, *Gossum*, *Lufttröhrenbruch*, *Kropf*, *Ger. Goitre*, *Fr. Bronchocele*, *Gozzo*, *Ital. Thyrophraza*, *Alibert. Cynanche Thyroidea*, *Conradi. Goitre*, "*Derbyshire Neck*."

CLASSIF. 4. *Class*, Local Diseases; 6. *Order*, Tumours (*Cullen*). 6. *Class*, Excrent Function; 1. *Order*, Affecting the Parenchyma (*Good*). IV. **CLASS**, IV. **ORDER** (*Author*, see *Preface*).

1. **DEFIN.** Chronic enlargement of the thyroid gland, sometimes with change in the surrounding parts, generally increasing slowly, often continuing for years, and depending upon constitutional causes.

2. **I. CAUSES, AND MORBID RELATIONS.**—This disease is *endemic* in Derbyshire, and some other parts of this country; but most remarkably so in Switzerland, various adjoining districts, and in some places in South America. It usually occurs during the early epochs of life, most frequently about the period of puberty, in persons of a weak and lax fibre, and generally in females; it very seldom being observed in Great Britain in males: but the comparative frequency of it in the latter sex is greater in Switzerland, and other parts where it is very prevalent, and is connected with cretinism. In a considerable number of cases which have come before me in females, I have never met with any before the period of commencing puberty,—not even at the Infirmary for Children; although the menses have often been delayed for a year or two, or even longer, when the tumour has appeared at this epoch; and I have seldom observed an instance in this sex unconnected with some kind of irregularity of the menstrual discharge, or disorder of the uterine functions. In two cases, occurring in married females, who were under my care, unhealthy or irregular menstruation had existed during the continuance of the goitre; in one case for eight years, in the other for five: upon its disappearance, pregnancy took place in both. Suppression of the menses has sometimes caused its sudden appearance and rapid development; and it more rarely has originated during pregnancy and the puerperal states. Authors have adduced conclusive proofs of its occurrence hereditarily, independently of endemic influence.

3. *Dr. Goon* has attributed the disease, in a great measure, to poverty, and the nature of the food: the rich being exempt from it. This is, however, very far from being the case. I have seen several cases of bronchocele in the richest in this metropolis. He is also wrong in attributing it to the use, in Derbyshire, of *outen cakes*. In Scotland, where this article of diet is in general use, bronchocele is rare.

4. That it chiefly depends upon certain physical causes is shown by its prevalence in certain districts in preference to others, and by the circumstance of its disappearance when persons affected by it endemically have changed their

residence. *M. ALIBERT* mentions his having seen it disappear after a residence in Paris. It has been very generally imputed to the water used by those affected. Since the time of *PLINY*, it has been attributed to the use of snow water. But it prevails in several places where this cause does not exist, as in Sumatra, and several parts of South America. The Swiss who drink snow water are free from the disease, while those who use hard spring water are most commonly affected. Captain *FRANKLIN* states, that at a part in his journey to the Polar Sea, where bronchocele prevails, it is confined to those who drink river water, and that those who use melted snow escape. *Mr. BALLY* ascribes its frequency, in a district in Switzerland, to the use of spring water impregnated with calcareous or mineral substances; and he states, that those who use not this water are free from both goitre and cretinism. *Dr. COINDET* observed that the inhabitants of Geneva, who drink the hard pump waters, are those most liable to bronchocele. Its prevalence in Nottingham is ascribed by *Dr. MANSON* to the same cause; which also seems to occasion it in Sussex and Hampshire, in the valleys of which counties it is frequently met with.

5. That this is, however, not the only cause, may be inferred from other physical circumstances connected with its endemic prevalence. Its great frequency in low, moist, marshy, and warm valleys, and the exemption of the inhabitants of dry and elevated situations, have been shown by *LARREY*, *FODÉRÉ*, *SASSURE*, *REEVES*, *CLARK*, *VALENTIN*, *POSTIGLIONE*, and *J. JOHNSON*, as respects various districts in Switzerland, the Tyrol, Carinthia, the Vallais, and the north of Italy. Similar facts have been adduced by *Dr. GIBSON*, and *HUMBOLDT*, in regard to the United States, and South America. It is most probable, however, that the exhalations from the soil of those localities are not the only, but a concurrent cause, cooperating with others possessing equal influence in the production of the disease, and particularly with the nature of the water. But it as certainly sometimes appears where neither of those causes can be traced, as in London; disorder of some kind in the uterine functions being the most frequent morbid relation it has presented, as far as my experience has gone. Its connection with cretinism in the districts on the Continent above alluded to, and the occasional appearance of the disease at very early periods of life—it being even sometimes congenital, in these countries, as well as being more common there in the male sex than in this country—are matters of some interest, and not readily admitting of explanation; since poverty, close, confined, and ill-ventilated apartments, are not the chief causes of those phenomena, as shown by their absence in the poorest classes in this metropolis. *Dr. PARRY* has seen goitre follow diseases of the heart, and epilepsy. *FLAJANI* has noticed the common occurrence of palpitations and affections of the lungs from the disorder it has occasioned of the respiratory function. When the tumour is very large, or hard, or when it has increased suddenly, it not infrequently occasions most urgent symptoms, by its pressure on the trachea, oesophagus, and jugular veins.

6. As respects the external and internal appear-

ances of this tumour, I may briefly observe that it affects generally the whole gland; but is also sometimes confined to the lateral or to the middle lobes: it is more rarely larger on one side than another. At first it is commonly compact, rounded, and equal; but, as it increases, it is either soft and flabby to the touch, or unequal, irregular, hard, and obscurely lobulated. It is usually free from pain, and is not discoloured. When it is greatly increased in size, and is soft, it appears pendulous, chiefly owing to its lower parts being most enlarged. When the tumour is divided, the cells of the gland are found, according to HUNTER, BATLIEU, and B. BELL, filled with a more or less viscid fluid; and are of various sizes, generally from that of a pea downwards, not only in different cases, but even in the same gland. In the older, harder, and more irregular forms of the tumour, melicerous, steatomatous, cartilaginous, and ossific deposits have been met with in parts of it, by CELSEUS, DE HILN, FREYTAG, GIRAUD, MEDFUS, and others. The usual state in which this disease presents itself, obviously, is that of an increased secretion into the cells of the gland, distending them more or less; the other changes sometimes observed, being consequences of obscure irritation induced in parts of it during its continuance or growth.

7. II. DIAGNOSIS.—It is necessary to be aware that other diseases of either a more acute or malignant character may affect the thyroid gland and its vicinity, and be mistaken for bronchocele. 1st, The gland may be either healthy, or but little enlarged; the tumour consisting chiefly of thickened surrounding cellular tissue, sometimes containing cysts filled either with a serous, albuminous, or purulent matter. Large *encysted tumours* may also form in the course of the trachea. But these may be readily distinguished by their situation, form, and fluctuation. 2d, The gland itself may be the seat of *chronic or acute inflammation*. In this case the swelling increases more rapidly, but seldom attains a large size; and is generally attended by redness of its surface, and increased temperature. It is also painful, particularly on pressure, and is very hard. I lately saw a case of this description, in a married female of about thirty, who was also seen by Mr. LLOYD, where the inflammation had proceeded to suppuration, and had terminated in an external opening. I believe that inflammation of the gland never occurs but in scrofulous habits. 3d, The gland may also be the seat of *scirrhus*, which may ultimately go on to carcinomatous ulceration; but this is a rare occurrence. In this case the gland is very hard, seldom large, sometimes scarcely increased in bulk, and is the seat of sharp darting pains. It is only met with in persons advanced in age. ARNETT states, that he has observed a case of goitre pass into cancer; but I doubt the fact; cancer having a very wide and indeterminate signification with this writer. The disease can scarcely be mistaken for aneurism of any of the thyroidal arteries, if any share of attention be directed to the subject. Bronchocele has been considered in the light of a strumous disease—as a form of scrofula. Dr. POSTIGLIONE, however, contends that no connection exists between these diseases. As respects the state of morbid action in the gland, the concomitant phenomena, and the respective termin-

ations of both diseases, there is certainly no intimate relation between them.

8. III. TREATMENT.—Previous to the use of iodine in the cure of bronchocele, numerous remedial means were recommended by writers. Of these, the most common were frictions with various liniments; dry rubbing; stimulating and astringent lotions; cold bathing, and cold douches; mercurial applications; plasters with cicuta and ammoniacum, or with ammoniacum and hydrarg.; repeated blistering; leeches applied to the tumour; electricity and galvanism; moxas, issues, and setons; ligature of the arteries supplying the gland, and extirpation of the gland itself. Amongst the internal remedies recommended, I may notice the various preparations of mercury; digitalis combined with camphor (OSSINGER); sulphuret of potash; muriate of barytes (POSTIGLIONE); cicuta or belladonna, either alone, or with the muriate of baryta; the muriate of lime; preparations of potash and soda; various mineral springs; the use of sea water, and of distilled water; the ammoniated muriate of iron; burnt sponge, given either alone, or with mercury; and the ashes of the *fucus vesiculosus* (RUSSELL).

9. Of all these, the most celebrated was burnt sponge; and, after the discovery of iodine, this substance, which, having been found by Dr. SCHAUB, of Berne, to be contained in official sponge, was recommended by him in 1829, and adopted by Dr. CORNET, of Geneva: and so successful has this medicine proved in the treatment of bronchocele, that, of a hundred and twenty cases treated with it by Dr. MANSON, of Nottingham, seventy-nine were cured, eleven greatly relieved, and two only were not benefited by it. Of several cases of the disease which have come before me since the introduction of this remedy into practice, there has not been one which has not either been cured or remarkably improved by it. I believe, however, that although it has been found the most certainly beneficial of any medicine ever employed in bronchocele, some other practitioners have not derived an equally uniform advantage from its use. I can account for this only by considering that it has been given in too large and irritating doses, or in an improper form; and without due attention having been paid to certain morbid and constitutional relations of the disease during the treatment. The cases of two females who were lately completely cured by the remedy confirm this inference. They had both had the tumour for several years, one for nine years; and had, on former occasions, gone through long courses of iodine, prescribed by judicious and eminent practitioners, but without advantage. When this medicine was ordered by me, it was, therefore, with great difficulty that they were induced to have recourse to it again. It was ordered in very small doses, often repeated, and strict attention was paid to the state of the secretions, and to the uterine functions. In the course of a fortnight an improvement was manifest; and of a few weeks longer, a great decrease of the tumours had taken place. One of these females, a married woman, who had been once pregnant nine years before, upon the disappearance of the tumour came with child; soon after which it somewhat suddenly reappeared, but the resumption of the iodine again dispersed it. The preparations given

in the Appendix (F. 204. 277. 278. 302. 323. 324.) are those which an extensive experience of its effects in various diseases, as well as in this, has led me to adopt.

10. In respect of the use of iodine in bronchocle, the weaker preparations should be at first preferred; and care should be taken never to exhibit them to the extent of irritating the stomach or bowels: when this effect is produced, little or no benefit will be derived from them. The success which Dr. MANSON and M. LUGOL have derived from this valuable medicine, I know from experience to be chiefly owing to the small and soluble doses in which they exhibited it. In some of the more obstinate cases, it will be often requisite to assist the operation of iodine by other means. Sometimes the occasional use of emmenagogue aperients will be of much service; and when the uterine functions evince disorder, as they very frequently do in cases occurring in females, I have usually directed either the sub-borate of soda, or milk of sulphur, to be taken, in the form of electuary, every night (F. 89. 281.). A calomel purge will also be sometimes of service. I have generally preferred the internal to the external use of the medicine in this disease. In some more obstinate cases, they may be both employed; but its external application should be of the mildest kind. In some cases, a moderate blood-letting may be premised; and some writers recommend that leeches should be applied to the tumour itself. Nearly all the cases which I have seen, having occurred in females, in whom it appeared requisite either to promote the menstrual discharge or to subdue uterine irritation, I have usually directed the bleeding, when practised, to be performed in the feet, or leeches to be applied to the groins. Dr. COSTEN has adduced a case in which galvanism materially assisted the iodine in removing bronchocle.

11. Dr. KOTLEY has stated, that iodine should not be exhibited where there is a disposition to congestion in the head and internal viscera; when febrile and inflammatory symptoms are present; when gastric, hepatic, or intestinal disorder exists; and when there is a disposition either to hydrocephalus or to pulmonary consumption. This is in some respects just; but after depletions, and when the more marked symptoms of these disorders are subdued, iodine may, notwithstanding, be exhibited, if its effects be carefully watched, and if the mildest and weakest preparations be selected, and these be combined with anodynes and narcotics. I have observed that a continued course of iodine has sometimes had the effect, particularly during cold weather, of producing pain in the limbs or joints resembling rheumatism, which have continued to increase if the medicine was not for a time relinquished. This effect has never appeared during a course of less than six weeks. It has generally soon disappeared after an aperient operation from sulphur, and one or two warm baths. A change to warm weather has also removed it.

12. If iodine fail of reducing the tumour, and if its pressure occasion urgent symptoms, recourse must be had to surgical aid. For a full exposition of this part of the treatment, I must refer the reader to Mr. COOPER'S *Surgical Dictionary*, and limit myself to a brief enumeration of this class of measures. The first and most important of

these is the insertion of setons in the tumour. This practice was recommended by Dr. QUADRUS of Naples; and practised first in this country by Mr. COLLAND HUTCHISON, and with success. According, however, to the experience of Mr. JAMES, Mr. COOPER, and Mr. GUNNING, this practice is liable to occasion dangerous hæmorrhage, sloughing of the tumour, and irritation and inflammation of the trachea or larynx. Mr. LYFORD has, however, employed setons successfully; whilst HEDENUS states, that he has seen tetanus occasioned by their introduction. It has been recommended to cut off the supply of blood to the gland by tying its arteries; and the advice has been followed by BLIZARD, WALTHER, COATES, BRODIE, and EARLE. The cases thus treated by BLIZARD, COATES, and BRODIE, terminated unfavourably; whilst those by WALTHER and EARLE succeeded. Lastly, the tumour has been altogether removed by excision. DESSAULT first performed this operation successfully; GOOCH attempted it in two cases, but failed; DUPUYTREN and KILPIN also failed; whilst VOGEL, THEDEN, and GRAEVE, performed it with success; and HEDENUS, of Dresden, succeeded in six cases in which he resorted to this operation.

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BULIMIA. (See APPLITE.)

BULLÆ. — BLAINS. SYN. Φλιδραται, Gr. *Phlyctene*, *Ampulla*, Auct. Lat. *Bulle*, Plenck. *Ephylis*, Good. *Dartre Phlyctenoide*, Alibert. *Bulles*, *Ampoules*, Fr. *Blasen*, *Wasserblattern*, Ger. *Blebs*, Eng.

CLASSIF. 6. Class, 3. Order (Good). 4. Order (Willan). IV. CLASS, IV. ORDER (Author).

1. DEFIN. *An eruption of large vesicles containing a serous or sero-puriform fluid; frequently succeeded by yellowish or yellowish brown scabs, and sometimes by ulcerations.*

2. PLANCK first separated the individual eruptions belonging to this order from the vesicular

eruptions, to which they are intimately related, and formed them into a distinct class. WILLAN afterwards adopted a nearly similar arrangement, comprising under this head erysipelas, but leaving out *rupia*. M. BERTH has, however, with stricter propriety, excluded from it the former disease, and introduced the latter. Adopting, therefore, his classification, this order of eruptions embrace *pemphigus*, *pompholyx*, and *rupia*. These forms of bullæ proceed from internal causes; but various irritants, applied externally, will also give rise to a similar eruption. The influence of cantharides and other rubefacients, of excessive heat or cold, of friction, of poisons, &c., in occasioning vesications, is well known. In a pathological point of view, both the *bullæ* produced by internal causes, and the *vesications* formed by external causes, depend upon very nearly the same state of the *rete mucosum*. This tissue is more or less inflamed, or affected in such a way as to secrete a greater quantity of serous fluid than can be exhaled through the cuticle, which is thereby separated from the vascular tissue, and, by the increase of this fluid, elevated into blisters, or bullæ, of various dimensions.

3. The eruptions of this class are both acute and chronic. The parts affected are often preceded by more or less redness, and occasionally by a very slight elevation. But, in many instances, no such inflammatory appearances are observed before the serous effusion beneath the cuticle takes place. After an indefinite period, varying from a few hours to four and twenty, a small vesicle appears, and gradually enlarges, until it reaches, generally within eight and forty hours, a great size. The bullæ thus formed are at first tense, and the fluid contained in them serous and transparent; but it sometimes becomes, especially at a later stage, sero-purulent, and rarely sero-sanguineous. After an uncertain time the bullæ pass from a tense to a flaccid state, the included fluid, at the same time, assuming a very slightly opaque and thickened condition. If they be situated where the epidermis is very thin, or occur in very young infants, they often break before this change in the fluid takes place. But where they are more persistent, the humour becomes thicker, and often forms scabs of a light yellowish colour. The affected parts of the skin are afterwards either provided with a new cuticle, or are affected with more or less severe ulceration. Bullæ may thus appear in any part of the surface, and even in the scalp, and be more or less numerous, or thickly scattered over the body. I have observed them so extensive, as respects both number and size, as to occasion death, obviously from the constitutional disturbance and irritation resulting from the loss of the cuticle over more than two thirds of the whole surface of the body.

4. These eruptions are also either idiopathic or symptomatic—most frequently the latter. They may also be infectious, or dependent upon the air of an hospital. Thus I have seen them prevail (chiefly in the form of pemphigus) at one time, in Queen Charlotte's Lying-in Hospital, to the extent of affecting nearly all the infants born there during several months, notwithstanding fumigation and whitewashing were resorted to; no other disease having occurred there during that period. In a chronic state, they are usually symptomatic of irritation or other disor-

der of the digestive organs, more especially of the alimentary canal; of chronic bronchitis, and of general cachexy. They are sometimes observed as an attendant upon small pox, and very rarely in the other exanthemata.

BIBLIOG. AND REFER. — *Bateman*, Synopsis of Cut. Diseases, &c. 7th ed. p. 193; and *Med. and Phys. Journ.* vol. xi. p. 230. — *Tilesius*, in *Martens's Paradoxien*, &c. *Leips.* 1802, b. ii. heft. i. p. 18. — *Rayer*, *Traité des Maladies de la Peau*, &c. t. i. p. 142. — *Cazeneuve et Schedet*, *Abrégé Pratique de Maladies de la Peau*, &c. Paris, 1828, p. 125.

CACHEXY. SYN. *Cachexia* (from *kakos*, ill or bad, and *êxis*, a habit). A *bad Habit of Body*.

CLASSIF. Constitutes the 3d Class in Dr. Cullen's Nosology; and the 4th Order in the Class, Diseases of the Sanguineous Function, in Dr. Good's Arrangement. I. CLASS, V. ORDER (Author, see Preface).

1. DEFIN. *Depravity of the constitution, without fever, affecting more or less the solids, the circulating fluids, and the secretions.*

2. The chief characteristics of this state are, want of vigour and vital cohesion of the soft solids, with defective digestion and assimilation, diminished animal warmth, universal languor, and deficient strength or activity. The skin is usually pale, yellowish, or lurid; and the white of the eyes in some cases almost transparent. As this state advances, the countenance becomes pale, white, or bloated; the skin loses its vital tint, and changes either to a dirty white, or to a yellow hue. The muscles are flaccid, and deprived of their healthy elasticity; the mind is inactive; the breathing difficult upon exertion; the feet and ankles swollen; the pulse slow and soft; the eyelids cedematous; the urine turbid; the alvine evacuations irregular and offensive; the sleep oppressed, and all the vital manifestations are enfeebled and languid. In females, more or less of these symptoms are associated with suppressed, retained, morbid, or irregular menstruation; pains in the forehead, back, loins, or limbs; palpitations; and longings for noxious or unwholesome articles of food, or for what is not food. (See APPETITE—*Morbid*, and CHLOROSIS.)

3. This state of disease appears to be chiefly the result of diminished vital energy, produced by various mental and physical causes; in consequence of which state the food is not sufficiently elaborated and assimilated, the circulating fluid does not experience the requisite degree of change resulting from nervous influence, and the action of the viscera, and the secreting functions are imperfectly executed, whereby the whole mass of blood is impoverished or deprived, the manifestation of the nervous and muscular systems are feebly performed, and, ultimately, the whole of the structures more or less vitiated. (See BLOOD—*Alterations of, in Disease.*) Cachectic maladies are very frequently associated with, or preceded by, obstruction, or other disease of some important viscus. If the pulse does not exceed 80 or 84, particularly towards evening, we may conclude that the lungs are sound; and if the pulse be regular, and the sleep undisturbed, we may infer that the heart and its capsule are not, at least, seriously affected. The viscera most frequently diseased are the liver, mesenteric and lymphatic glands, the spleen, pancreas, kidneys, uterine organs, stomach and bowels; and the affection of these is sometimes a cause of, at other times an

attendant on, or even consecutive of, the cachectic state; the vital endowment of the frame being the first to experience the morbid change. It would appear that the earliest manifestation of this change takes place in the ganglial system; the internal viscera and circulatory organs, whose functions are actuated by this system, becoming next disordered, generally in such a manner as to attract the attention of the observer to the nature and source of disturbance.

4. The TREATMENT of cachexies chiefly consists of light nutritious food, taken in such quantity as the digestive organs can easily dispose of; healthy air, or change of air, with gentle and regular exercise, short of fatigue; of tonics combined with deobstruents and gentle aperients, in order permanently to excite the languid powers of life, and to promote the functions of the secreting organs; and of the use of chalybeate and deobstruent mineral waters, with frictions with stimulating liniments, and pleasant mental occupation. The sulphate of quinine, or the preparations of cinchona, particularly its compound tincture, with small doses of the oxymuriate of quick-silver; the various vegetable tonics, bitters and aromatics, with the mineral acids, especially the chloric acid; the preparations of iron; the chlorates of potash, soda, and lime; sarsaparilla, with guaiacum, &c.; the balsamic and terebinthinate substances; camphor, and the essential oils, and the preparations of iodine; are most serviceable in cachectic diseases, either exhibited singly, or combined with laxatives or purgatives so as to promote the secreting and excreting functions. As the various disorders of this description are often connected with obstructed function, or infarction, of some important viscus, it will frequently be requisite to exhibit at the same time, or in conjunction with some of the above remedies, small doses of blue pill, or of the hydrargyrum cum creta; or to combine them with rhubarb, aloes, or other purgatives, and often to add to them aromatics or warm gum resins. The object in these cases is to promote a regular action of the viscera, by increasing their vital energy; and this is better attained by adopting measures calculated to benefit the general health, and to increase the action of the stomach and bowels, than by the occasional use of active and debilitating cathartics; which, however, operate more efficiently and much more beneficially in those cases, when combined with bitters and tonics, — a fact long since insisted on by HOFMANN, and others. (See also MERCURIUS CACHEXY, SCROFULA, and SYPHILITIC CACHEXY.)

BIBLIOU. AND REFER. — *Bumetus*, Sepulchretum, l. iii. s. xx. obs 1—14. — *Wedel*, De Cachexia, Jen. 1715. — *Stahl*, Diss. de Cachexia, Halle, 1710. — *Hoffmann*, De Cachexia, Opera, t. iii. p. 318. — *Nicolaï*, Diss. Sistens Genium Cachexie Indolem, Jenæ, 1760. — *Fogel*, Diss. Sistens Cognitionem Morborum, Goet 1763. — *Hedekind*, Ueber die Cachexie im Allgemeinen, &c. 8vo. Leipz. 1796.

CACHEXY, AFRICAN. SYN. *Cachexia Africana*, *Negro Cachexy*, *Dirt-eating*, *Mal d'Estomac*, &c.

CLASSIF. I. CLASS, V. ORDER (Author, see Preface).

1. DEFIN. General cachexy, with vitiated functions of the stomach and bowels, and a propensity to eat chalk, clay, or other dirty and unwholesome substances, generally affecting the aborigines of intertropical countries, &c.

2. This disease is a complication of cachexy with anæmia and pica, or depraved appetite (see APPETITE — *Depraved*), at least in its advanced stages. It is very common amongst the natives of Africa, and the slaves in the West Indian colonies; and is attended with loss of appetite, continued pain of stomach, whiteness of tongue, difficulty of breathing upon the slightest exertion, drowsiness, inactivity, and general debility, despondency, with fondness of solitude, paleness of the face, lips, and palms of the hands, coldness, and often œdema of the extremities, glassy state of the *tunica adnata*, weakness and smallness of pulse, scanty, pale, or milky urine, whitish or clay-coloured stools, with other signs of depressed vital power and deficient assimilation. Owing to the depressed energies of the frame, and particularly of the digestive organs, a vitiated state of the juices of the stomach, with morbid acidity of the *primæviæ*, evidently prevails; occasioning sensations which probably excite the patient to have recourse to chalk, clay, or other absorbent matters to relieve them, and which occasion whatever vitiation of appetite may be additionally observed. This morbid condition appears, however, not to be limited to the stomach, but to be extended along the alimentary canal: the mucous surface of the bowels are in a state of morbid irritation, giving rise to offensive evacuations; the lacteal and mesenteric glands become irritated and obstructed, owing to the passage through them of unhealthy chyle and morbid secretions, and subsequently incapable of conveying sufficient nourishment into the circulation; the blood is thus rendered poor, pale, and in all respects such as is described in the article on the *Itæon* (§34. et seq.); and the liver, pancreas, spleen, lungs, and heart, become pale, atrophied, and sometimes softened, from being deprived of the requisite nourishment, and supply of the circulating fluid. And at last the patient sinks, from depression of the vital power and anæmia, presenting the following appearances on examination:—

3. The stomach is often flabby, softened, apparently distended, and pale. The liver is sometimes enlarged; occasionally atrophied, hardened, and generally very pale. The bile is usually watery, pale, or straw-coloured: the gall-bladder has contained biliary concretions in a few cases. The mesenteric glands are always enlarged and hardened. The mucous follicles of the intestines are often morbidly developed. The heart is soft and flabby; the blood in its cavities and large veins is watery and thin; and sometimes fibrinous concretions are found in these situations. Serous effusions, to a greater or less extent, are also frequently found in the thoracic and abdominal cavities.

4. CAUSES.—This affection is very nearly allied to chlorosis: but whilst the latter affects females, and most commonly about the period of puberty, the former occurs in both sexes, and sometimes at as early an age as six or seven years. It is generally attributable to depressing or debilitating causes — mental or physical. The despondency and grief occasioned by separation from the place of nativity and friends, and by a state of bondage, often dispose to it; and thus it is not infrequently accompanied with nostalgia. The lax and weak habit of body, and the indolent disposition of the negro, seem also to favour the appearance of the

disease, particularly in those who have been badly nursed and neglected in early life. The chief exciting causes are, poor diet, hard labour, harsh treatment, exposure to cold and moisture, insufficient clothing, and venereal excesses early indulged in. The causes of the disease, the symptoms it presents in its progress, and the appearances observed after death, are altogether irrefragable evidence that it proceeds from great depression of the vital energies, especially of the digestive organs; occasioning, in its more advanced states, anæmia, imperfect nutrition, and vitiation of the fluids and soft solids of the frame.

5. The TREATMENT is in no respects different from what has been recommended in general terms in respect of *CACHEXIA* and *Depraved APPETITE* (see these articles). Warm clothing, and a digestible nourishing diet, are indispensable to recovery: and to these should be added, regular but moderate exercise; bathing, followed by frictions of the surface; tonic, aromatic, and saline medicines; the use of the carbonates of the alkalies, combined with tonics and hot spices. Warm stimulating laxatives, such as the compound tinctures of rhubarb or aloes, or the bitter aperient tincture (F. 699.); the elixirs prescribed in the Appendix (F. 103—106.); the preparations of iron, cinchona, and myrrh; are severally of the greatest benefit, especially in conjunction with warmth, a residence in a warm dry situation, and sufficient nourishment. Care also ought to be taken to preclude any access to the substances for which the morbid propensity is entertained.

BIBLIOG. AND REFER.—*Davidson*, New York Med. Repos. 1799, vol. ii. No. iii. art. 6.—*Chisholme*, in *Ibid.*, and Med. and Phys. Journ. 1800, p. 614.—*Hunter*, On the Diseases of the Army in Jamaica; and in Edinburgh Medical Commentaries, vol. xiii. p. 194.

CÆCUM. — ITS DISEASES. 1. This viscus is not infrequently the seat of dangerous and fatal diseases, without any other part of the digestive tube being affected; and it is evidently concerned in the production of other disorders, in which it has usually been considered as merely accidentally to participate. If we consider its anatomical relations and functions in man and the lower animals, we shall be justified in viewing it as a distinct organ, performing offices modified in their nature from those of the rest of the alimentary tube.¹ Notwithstanding this individuality, both its functions and its diseases have not generally attracted that degree of attention, nor received the investigation, they evidently deserve; and, hitherto, the latter have not even obtained a place in practical or systematic works. Some years ago, I took occasion to notice the importance of the offices and pathological states of this viscus, and detailed some cases in which it was remarkably diseased. Several facts illustrating the practical part of this subject have been recently accumulated, and some have since been observed by myself. From these sources, I shall arrange all that is known respecting the diseases of this organ, after having premised a few remarks on its functions.

2. The resemblance of the cæcum to the stomach in most of the graminivorous, and particularly the ruminating, animals, as well as its form and situation throughout all the higher classes of the animal kingdom, are circumstances showing that it is an important viscus, and one in which the last act of digestion is performed. M. Vi-

RIER appears to have been the first who entertained correct ideas of the actions of this viscus. "Sed de intestino cæco," he states, "quidquam dicere præstat, cum in quibusdam animalibus sit summè necessarium, nempe quibus et amplissimum, forsanique vicem alterius ventriculi gerit; nam glandulis crassioribus donatur, quorum succus solutione heliotropii rubescit, et solutione sublimati albescit, suisque salibus acidis et volatilibus præditi sunt." (*De Prima Coctione*, p. 270.) This view has been recently confirmed by the able researches of TIEDEMANN and GMELIN, professors at Heidelberg. The situation of this organ, its capacity, its attachment to the parietes of the abdomen, and the circumstance of its contents being propelled in opposition to their gravity, are proofs of their longer retention than those of any other part of the digestive tube; and confirm the view that has been taken as to its being, in some respects, a reservoir, wherein is poured that portion of the materials remaining in the ileum, in order to undergo the latter stages of digestion, and the first of fæcation. Besides other proofs of these functions, it may be stated, that it is very abundantly supplied with large follicular glands, which, according to the experiments of TIEDEMANN and GMELIN, secrete an acid, albuminous, and solvent fluid, which mixes with, and promotes the digestion of, those portions of aliments which have withstood the actions of the stomach and small intestines, or been insufficiently changed by them. In order that this office may be the more completely performed, the anatomical relations of the cæcum admit of the remora, for a longer or shorter time, of the matters which pass into it; so that a last effort is here made to obtain the remaining nourishment from the ingesta: and thus it performs, if not the very last act of digestion, at least the last important part of it. But it also seems to fill an additional office, namely, that of secreting, chiefly from its numerous follicles, an unctuous or oily fluid for the protection of the surface of the large bowels from the irritating effect of the fecal matters passing along them; and it is probable that the constituents both of this fluid, and of the other secretions poured out from its surface, consist of elements that require to be eliminated from the blood; so that, in addition to its other functions, it is also a depurating organ.

3. The usual contents of the cæcum are of the consistence of a soft *bouillie*, or gruel, of a brownish yellow colour, and here first acquire their fæculent odour; which, according to TIEDEMANN and GMELIN, proceeds from the volatile oily substance secreted by its follicles. During the changes that are effected by the cæcum on its contents, an acid and hydro-sulphuretted hydrogen gas is disengaged. This gas seems to be generated only in small quantities during the healthy functions of the organ; but when its vital energies are diminished, and when, consequently, a greater remora than usual of its contents takes place, air is disengaged in much greater quantities, and sometimes to the extent of injuring its healthy tone. Whilst the cæcum reacts energetically on the distending power, this flatus, along with a portion of its contents, are thereby propelled along the colon: but on many occasions, and under particular circumstances, considerable opposition about

the right flexure of this bowel is offered to their transit; and hence, pain and uneasiness in this part of the colon, as well as in the cæcum, are complained of; giving rise to the idea of the existence of either hepatic or nephritic disease.

4. Under other circumstances of protracted disorder of the digestive organs, as when acidity is generated in the stomach and small intestines, and the food imperfectly digested; or when the ingesta are of a stimulating, irritating, or otherwise unwholesome kind; or when the secretions of the liver, pancreas, and mucous surface of the small intestines, are of a morbid or excoriating nature, — then the accumulation and remora of these matters in the cæcum are productive of disorder of its functions, of inflammation, and even of change of its structure.

1. DISORDERED FUNCTIONS OF THE CÆCUM. CLASSIF. I. CLASS, I. ORDER (*Author*).

5. When the vital energies are weakened, and the alimentary canal debilitated, the cæcum often betrays greater disorder than any other part of the digestive system. Its situation and functions will, from what has already been stated, account for the frequency and importance of its diseases. In some cases, the irritation produced by morbid or accumulated matters in it is slight, and readily productive of sufficient reaction of its muscular coats to propel them along the colon. In other instances, the efforts made to accomplish this end, owing to the obstructions occasioned by the lodgment of flatus about the right flexure of the colon, or by irregular spasmodic contractions of this bowel, are ineffectual, and give rise to colicky pains. If the interruption is removed, disorder soon subsides; but if it continue for any considerable time, the more violent forms of colic or ileus supervene. When the internal surface of the cæcum is in an irritable state, disorders of this description are readily produced by the accumulation, even to a small extent, of the intestinal matters poured into it from the ileum, especially when they are of a more than usually stimulating kind, or if the secretions be morbid. In young, irritable, or nervous persons, and in those who partake of much acid or unripe fruit, or who neglect their bowels, particularly females who wear very close cinctures around the upper part of the abdomen, diseases affecting the alimentary canal, and, sympathetically, some other parts of the frame, not infrequently thus originate in this viscus. Accumulations, however, of alimentary and fecal matters sometimes take place in it to a great extent, without producing much disorder, until the distension and irritation thereby occasioned give rise to disease of its internal surface, of its follicles, or its parietes generally. Persons advanced in life, of a phlegmatic temperament, or lax and torpid habit of body; those who take little exercise, or whose occupations are sedentary; and especially aged females; are very liable to be thus affected. During this state of infarction, the retained matters are more or less changed, partially decomposed, become acrid, excoriating, and a source of irritation both to the mucous surface itself, and to its follicles; which are thereby obstructed, and ultimately inflamed and ulcerated. In this way, most of the morbid states about to be described originate.

6. Several instances have been recorded by the older writers, where the stones of fruits,

biliary and intestinal concretions, and hardened fecal matters lodged in the cæcum, have occasioned severe colic, and even fatal ileus. Some cases of this kind are referred to in Dr. MONRO's instructive work on Morbid Anatomy, as having occurred in his and his father's practice. In one of these, a concretion upwards of seven inches in circumference filled up this viscus. FONTANUS found an earthy concretion in it, as the only morbid appearance after death from ileus; and HELM, nearly three hundred cherry stones in the same situation, and in the ileum before it opens into the cæcum, in a fatal case of this disease. In some instances, accumulations of fecal matters with great distension occur, without much suffering referrible immediately to the cæcum being experienced; the organs affected secondarily evincing the most marked disorder. This was shown by the case detailed by M. ODIER, of Geneva, of the celebrated M. DE SAUSSURE, in whom this viscus was very greatly dilated. When very much distended, it is generally diseased in other respects; its coats are more or less thickened, inflamed, and ulcerated, or its follicles enlarged. MONRO, NACQUART, and others, have adduced instances in which its engorgement and enlargement were accompanied with chronic inflammation and thickening. Mr. WILMOT relates a case in which it was dilated to the extent of containing a gallon, filled with fecal matters, and perforated by a circular ulceration. When the distension by accumulated matter is great, it may, from rising high in the abdomen, and pressing upon the nerves, vessels, and ducts in its vicinity, occasion numbness, and oedema of the right lower extremity, retraction of the testicle, and derangement of the urinary secretion; and thus be mistaken for disease of the kidney. M. JUCOS has detailed an instructive case of this kind; and two similar instances have been observed by me. In general, the seat of the tumour arising from collections of morbid matters in the cæcum, and the disorders connected with it, readily lead to the recognition of its nature, as in the case recorded by Dr. BARTLOW. When, however, there is little or no tumour formed, and the symptoms are of a chronic and less violent kind, the cause of disorder may long exist in this situation, and escape detection. In a case of a young lady whom I attended with Mr. ANDESLEY, this part was considered as the seat of disorder, from its fulness and hardness upon an examination made when the patient was semi-recumbent, and the thigh slightly bent, and a treatment in accordance with this view strenuously insisted upon. She had been attended by several eminent physicians during the preceding three or four years, and very different opinions entertained of the nature of her ailments. After persistence in the treatment about to be recommended, an evacuation of hardened balls, containing indigestible substances which she had chewed many months previously, were evacuated, the fulness and hardness in the right iliac region disappeared, and the patient perfectly recovered. Two nearly similar cases to this were detailed by me in a work referred to below.

7. Substances incapable of digestion, either taken accidentally or from a depraved appetite, also frequently lodge in the cæcum, and remain in it for a very long period, sometime without

producing much disorder, at other times occasioning the most violent effects. In other cases, in addition to various morbid matters, large balls of worms, both lumbrici and ascarides, collect in this viscus, and occasion much local irritation, or even inflammation of its inner surface, and constitutional disturbance. Mr. BLACKADDER has detailed some interesting instances of this occurrence. He found, in a patient who had complained of disorder of various organs, and of a gnawing soreness in the right iliac region, ragged ulceration of the inner surface of the cæcum, which contained an immense number of worms. The rest of the alimentary canal was sound.

8. When the cæcum is much enlarged, or otherwise diseased, it may also be *displaced*. Cases are recorded by SALZMANN and ANNESLEY, in which its attachment to the internal iliac muscle had yielded so far that it had passed over to the left side; and others, in which it had descended very low into the middle of the pelvis, and pressed upon the urinary bladder.

9. Not only may indigestible substances and morbid concretions sometimes lodge in the cæcum, producing much local irritation and general disturbance, but they may, when small, sometimes pass into the vermiform appendage, where they occasion, as will be shown in the sequel, the most dangerous effects. It does not, however, appear that the simple presence of any of these substances in this process is always followed by such results. Mr. BLACKADDER relates a case in which he found a small concretion in this part, and yet the patient had not complained of any symptom referrible to the right iliac region. I have treated, or been consulted respecting, four cases, in which foreign bodies and concretions were found in the appendix after death; and in all, the symptoms were those of the most violent peritonitis complicated with ileus, and terminating in sphacelation of this process itself. Two of these I attended with Mr. PAINTEB, of Crawford-street, by whom the inspections were made; and who ascertained that the substance found in the appendix, in one case, consisted chiefly of cholesterine.

10. The *phenomena* usually occasioned by faecal matters collected in the cæcum, and by distension, enlargement, or irritation of this viscus, will necessarily vary with the nature of the offending substances, the extent to which they may have accumulated, and the age, temperament, and habit of body of the patient. The disorders which result are, 1st, Local; 2d, Symptomatic, and 3d, Constitutional. *a. The local signs* are more or less fulness, hardness, or distension in the right iliac region: sometimes, on examination carefully with the points of the fingers, the abdominal muscles being relaxed, a doughy hardness is felt. In other cases little or no pain, even upon a minute examination, is complained of; but occasionally, especially if the disorder be about inducing inflammation, both tenderness and pain either exist more or less constantly, or come on in paroxysms; and the patient generally reposes on the right side. When the bowels are constipated, and interruption of the passage of matters through the cæcum occurs, the paroxysms of pain are very acute, and sometimes attended by vomiting, and all the symp-

toms of the most severe colic, or even those of ileus. In such cases, upon examination, signs of obstruction either in the cæcum or in its vicinity are detected, unless general peritonitis may have come on; and then the origin of disease is very generally referred to the cæcal region, or the tenderness and pain are most acute in that situation.

11. *b. The symptomatic disorders*, when this viscus is much distended, either by faecal or other matters, or by flatus, or by both, as is most commonly the case, are, numbness of the right thigh, œdema of the right foot and ankle; sometimes retraction of the testicle, or frequent calls to empty the bladder, and sometimes hæmorrhoids; uneasiness or pain in the right iliac region, often extending to the hypochondrium; various dyspeptic symptoms, costive or irregular state of the bowels; occasionally diarrhoea, with scanty, offensive, and mucous stools; and, if irritation be excited in the mucous surface and follicles of the organ, the efforts made to evacuate the bowels are attended by severe tormina, and even by retching. I have seen several cases of varicose veins of the leg, or indolent ulcers, and a case of disease of the bones of the foot, the occurrence of which was evidently connected with great distension and accumulations in the cæcum; the symptoms of this disorder, with more or less tumefaction and hardness in the iliac region, having been found on examination. The justness of this view was fully shown by the success of the treatment, which was based upon it.

12. *c. As long as the states of disorder have not advanced to inflammation or ulceration, the effects are often not very manifest upon the constitution.* The countenance and skin, however, are pale and lax; the complexion is deficient of clearness, and, with the surface generally, often covered with an oily or dirty moisture; the perspiration is fetid, and the breath offensive; the soft solids lose their elasticity, and are slightly emaciated; the lips are usually pale, the tongue white or loaded at its centre and base, sometimes red at its point and edges; the pulse is weak, soft, or small, frequently slow, but easily accelerated; and, at an advanced stage, the symptoms more clearly manifest that the blood is imperfectly depurated, or that it is affected by the absorption of a portion of the excrementitious matters retained in the cæcum. In addition to these symptoms, general debility, and disinclination to any physical or mental exertion, are often complained of. The above states of disorder continue for a longer or shorter period; when at last the local irritation either produces increased action of the muscular coat of the cæcum, and ultimately the dislodgment of the offending matters, or gives rise to acute or chronic states of inflammation, and various consecutive organic changes. In some instances, the accumulation in this viscus, and the spasm of the adjoining parts, amount to complete obstruction of the passage through the alimentary canal, even without inflammation or any disorganisation of the cæcum itself having taken place; causing violent colic and ileus, as in the cases already noticed (§410.); the most marked symptoms during life being referrible to the superior portions of the tube, and the lesions after death being most remarkable in those parts, particularly about the

termination of the ileum, and the ileo-cæcal valve.

13. *Treatment.*—The intentions in this state of disorder are very obvious; namely, 1st, to evacuate morbid collections; and, 2d, to prevent their re-accumulation, by preserving a regular tonic action of the viscus, and by strengthening the digestive organs generally. *a.* The evacuation of the accumulated or retained matters is to be attempted by means appropriate to the circumstances of the cases. If there exist irritability of stomach, or even any tendency to it, or to febrile action; or if there be any pain or soreness in the iliac region; full doses of calomel should be first exhibited, the enemata about to be suggested administered, and the liniments prescribed in the Appendix (F.296. 311.) assiduously rubbed over the cæcal region, with the view of exciting the healthy action of the viscus. If, on the other hand, the stomach and bowels be torpid, and the former can retain purgative or cathartic medicines, they may be given, selecting those which are the least irritating in their effects. I have seen inattention to this caution, the most stimulating cathartics having been exhibited, productive of the worst consequences; a state of disorder supply functional, or colic from distension and obstruction of the cæcum, being converted into either inflammation of the bowels or dangerous ileus. When, therefore, an irritable state of the stomach supervenes in our attempts to remove obstructions of this viscus, we should desist from the exhibition of purgatives, or even of aperients by the mouth, excepting full doses of calomel, or calomel combined with hyoscyamus or opium, and moderate doses of nitrate of potash, or sub-carbonate of soda, or of both, which will generally be retained, and will allay the sickness and retchings. But we ought strenuously to persist in the administration of enemata—preferring those which are oleaginous, saponaceous, and solvent—and in the use of the liniments. The enemata should be always large, and injected by means of the valve-syringe now in use, so that they may reach the seat of obstruction. In obstinate cases, this object will be facilitated by placing the patient upon his knees and elbows during their administration, and elevating the pelvis as much as possible above the rest of the trunk. The practitioner should not be discouraged by the ineffectual administration of several injections, but repeat them according to circumstances, employing at the same time frictions over the abdomen with the liniments already advised. If flatulent distension of the abdomen be present, they will assist in removing it; but in such cases the terebinthinate enemata ought to be preferred. When we suspect the presence of worms, in addition to other morbid matters, aloes and the alkaline solutions, assafoetida, camphor, linseed-water, &c. may be used in the injections. In the slighter and more usual cases, the aperients in common use, particularly castor oil, the compound decoction of aloes, the combination of the compound infusions of senna and of gentian, or the infusion of senna with decoction of cinchona, or the several formulæ of this description contained in the Appendix (F.215. 266. 562. 575.), may be prescribed, as they may appear appropriate to the circumstances of the case.

14. *b.* Having apparently removed whatever

obstruction may have existed,—the cæcal region being soft and natural, and the actions of the bowels free,—the object is next to prevent the recurrence of disorder, and to strengthen the digestive organs, by vegetable tonics and bitters combined with aperients; by sulphate of quinine with aloes; by small doses of blue pill with the alkaline carbonates and other deobstruents, and given occasionally with the view of promoting and correcting the secretions; by the occasional use of the liniments above referred to, or by wearing a warm stimulating plaster (see F. 109. 115. 117.) over the right inferior regions of the abdomen. In every case, attention should be paid to the state of the digestive, assimilating, and secreting functions; regular evacuations of the bowels promoted, by the occasional use of enemata; and the diet strictly attended to.

11. INFLAMMATION OF THE CÆCUM. CLASSIF.

III. CLASS, I. ORDER (*Author*).

15. Although inflammations of this viscus have been generally overlooked or confounded with those affecting either the colon, the small intestines, or the peritoneum, there are few diseases more defined in their character, or more distinctly limited in the great proportion of the instances of their occurrence, than they are. In respect of its *seat*, inflammation may affect chiefly the mucous surface, or the follicles, or all the coats of the organ more or less: or it may attack the vermiform appendix only, or the cellular tissue connecting the cæcum to the internal iliac muscle. As to the *character* of the inflammatory action, it may be sthenic and acute; or acute, asthenic, and spreading, as in dysentery and fever: it may also be more or less chronic. Cases of all these states of disease are to be found scattered through the works of modern medical authors, and most of them have come before me. The first case which attracted my attention to the importance of attending to the state of this viscus in various abdominal diseases, occurred in 1816, in a hot climate. The patient had the usual symptoms of inflammatory dysentery, with violent pain, and subsequently tumefaction in the cæcal region. The disease had been neglected in its early stages; and it was only shortly before the sudden subsidence of this tumour that I observed it. Upon straining at stool, a sensation of something having burst internally was felt; and very soon afterwards above a pint of purulent matter, mixed with a little blood, was discharged. Upon examination six hours after death, the cæcum was found ulcerated, discoloured, and nearly sphacelated, with an opening through the part attached to the abdominal parietes leading to the nearly empty sac of an abscess which had formed in the cellular tissue connecting this viscus to the side; the mucous membrane of the colon was inflamed in parts, and excoriated.

16. *i.* The CAUSES of inflammations of the cæcum are chiefly the functional disorders already described. A morbid state of the abdominal secretions, and particularly an increased secretion of vitiated acid bile; the irritation of foreign bodies, indigestible substances, and of worms; a strangulated hernia, or the pressure of an ill-constructed truss; the suppression of the hæmorrhoidal and menstrual discharges; and the presence of biliary or intestinal concretions, hardened feces, or the stones of fruits, or their escape into the vermiform

appendage. Inflammatory irritation of the mucous membrane and follicles of the viscus is not infrequent after child-birth, and as an attendant upon some of the diseases which affect chiefly the bowels of females at this period. In connection with the accumulation and retention of morbid matters, it very often constitutes the earliest pathological state in dysentery and diarrhoea, and consequently then arises from the same causes that produce those diseases.

17. ii. SYMPTOMS.—*A. Of inflammation of the mucous surface of the cæcum.* These chiefly consist of an irregular, mucous, offensive, and sometimes slightly bloody appearance of the stools, with tenderness upon pressure or examination of the cæcal region. The evacuations are generally preceded by tormina or griping pain, extending from this part upwards to the right side, and down towards the pelvis. The tongue is slightly loaded or furred; and more or less symptomatic fever is present. This state of disorder is liable to lapse into a chronic form, and to continue for a long period; or it occurs primarily, from the functional disorders already described, and sometimes fluctuates as to the degree of severity. In the more slight or chronic states of inflammation of this surface, the patient often complains of little beyond irregularity of the bowels and colicky pains in the abdomen, with slight emaciation, and loss of the healthy complexion; till, at last, an acute attack of the disease supervenes, from the extension of the inflammatory action to the more exterior coats; or the chronic organic change has proceeded so far as to implicate adjoining parts, and to occasion a train of severe symptoms. In this manner, the more dangerous forms of dysentery not infrequently take place. During the earlier states of inflammation of the internal surface of the cæcum, ulceration may have commenced, or the follicles become diseased, and the coats successively perforated, until the peritoneal covering is attacked; when the inflammation assumes more serious features, owing both to its extension, and to the nature of the tissues which are now invaded by it. The perforation may, however, take place in that part of the parietes of the viscus where it is attached to the iliac muscle; and thus inflammation be extended to, and abscess form in, the cellular tissue exterior to it, and break either externally, or into the cæcum, or both; a sinuous communication being thus formed between the cavity of the organ and the surface of the body. In the manner now described, the more acute states of inflammation of the cæcum, and its connecting tissue, may arise; or these states may primarily affect the different structures composing its parietes, or may originate in its vermiform appendage.

18. *B. Acute inflammation of the coats of the cæcum* generally commences with violent pain in the right iliac region, frequently attended with a burning sensation, and most exquisite tenderness, particularly when the serous coat of the viscus is affected. It is accompanied with the most severe tormina, extending from the above region upwards to the right hypochondrium, across the abdomen, down into the pelvis, and along the thigh of that side. If the disease be attended by distension of, or fecal collections in, the cæcum, the testicle is retracted, and the thigh either very painful or numb. While the pain

occurs in paroxysms, and shoots in various directions throughout the abdominal cavity, it is constant and fixed in the situation of the cæcum. The regions of the abdomen, although sometimes distended and tense, bear examination, excepting in the cæcal region and its immediate vicinity, where the least pressure cannot be tolerated. The pain is usually increased when the body is erect; and the patient reclines on the right side, with the trunk slightly bent, and the thighs drawn upwards, so as to relax the parts in the vicinity of the disease. The bowels are generally torpid; but vomiting is not complained of, unless obstinate constipation exists, or drastic purgatives have been given early in the disease. The pulse is usually quicker than natural; but it is occasionally not much affected; and the temperature of the surface is increased. In some cases, the above constitute the chief symptoms; but in others much more disturbance ensues, particularly if the disease advances, or is neglected in its early stages, and the peritoneal surface of the cæcum is affected. When such is the case, the local symptoms increase in severity; the abdomen becomes more generally tense and painful, owing to the extension of the inflammation over the peritoneal covering of the viscus and the adjoining parts; and the symptoms of peritonitis, often attended by obstinate vomiting, supervene, with great frequency of pulse, and general fever. If the appendix participate in the disease, the symptoms are still more acute; general peritonitis is very quickly produced; adhesions are formed between it and the adjoining peritoneal surface; and the appendix soon splacelates; a fatal result taking place, usually in a very short time. In other cases the disease assumes a somewhat less violent character, and terminates in suppuration, owing to the cellular tissue connecting the coats of the intestine to one another and to the abdominal parietes being chiefly affected. When this occurs, the issue is not so rapid as in the former instances, but is sometimes prolonged for a considerable period; and, in some cases, recovery is at last brought about. The foregoing history applies more strictly to inflammation originating in the cæcum; but when it commences in the appendix, or in the external connecting cellular tissue, the symptoms are often much modified.

19. *C. Inflammation of the appendix cæci* appears to be attended from its commencement with more acute symptoms than that of the cæcum itself. In four cases of this description which I have seen, this part was primarily and chiefly inflamed, owing to hard substances having escaped into it, and had occasioned general peritonitis, and gangrene of the appendix itself. In all of these, obstructions of the bowels, with obstinate retchings, was present at the time when I first saw them; and in the latter stages of the disease, vomiting was attended by violent tormina, and the discharge of matters evidently from the small intestines. Thus the symptoms of ileus were superadded to those of peritonitis. Upon dissection, the cæcum was found inflamed only in its peritoneal surface, in three of the cases; in the fourth, inflammation was observed also in its inner surface. In one, where the appendix contained a small biliary concretion, its extremity adhered to the surface of the cæcum after passing

around a convulsion of the ileum, which it had evidently strangulated; but at the time of the inspection it was quite gangrenous on each side of the concretion. In another case, appearances of strangulation were manifested in a less satisfactory manner; the surrounding parts being so agglutinated by albuminous exudations, that their respective relations were not obvious. It does not appear, however, that inflammation originating in the appendix always arises from substances having escaped into it. M. LOUYER VILLENAY has detailed two cases of a similar state and termination of disease to the above; one occurring without any apparent cause, the other seemingly from the pressure of a bandage in hernia. In one, published by Mr. PARKINSON, ulceration and perforation of the appendix had taken place from the lodgment of a small portion of indurated fæces in it. A very interesting case, where violent abdominal symptoms were occasioned by a large lumbricus, which had passed into the cæcal appendage of a person otherwise diseased, is recorded by Mr. BLACKADDER. M. THIERY found this part engorged with fæcal matters, and inflamed, in a fatal case of ileus; the cæcum being narrowed, but not otherwise diseased. HEISTER met with the appendix inflamed and ulcerated after death, with similar symptoms. AMYAND detected a small nail in this part after fatal ileus. MONEAU and KLOECKHOFF record instances of this disease produced by strangulation of the ileum by the cæcal appendage. Mr. WALDRON discovered a small concretion in it after fatal peritonitis; and MORGAGNI, VAN DOEVEREN, SANDIFORT, and several others, have detailed cases of both peritonitis and ileus, in which this part had adhered to adjoining parts; and, in some instances, a loop of intestine had been enclosed by it, and strictured. From the history of these and other cases, which have occurred to several of my medical friends, it may be inferred, that inflammation affecting primarily the cæcal appendage is most frequently brought on by hard substances having escaped into it; and that the inflammation rapidly extends to the peritoneum; giving rise to the exudation of albuminous lymph, to adhesion of its opposite surfaces, and of the appendix to adjoining parts, and to gangrene of this process.

20. Very acute pain, tumefaction, and tenderness, are complained of upon the invasion of this form of the disease, first in the right iliac region, and subsequently more or less over the abdomen; with excruciating tormina, obstinate constipation of the bowels, a very frequent, small, or contracted pulse, heat of skin, dry tongue, great thirst, sometimes with numbness of the right leg, or pain shooting down the thigh, and retraction of the testicle. Vomiting comes on sooner or later, and is often, at one period or another, attended by the discharge of matters from the small intestines—at least, in the cases which I have seen. The patient at last becomes restless, his countenance sunk, and a fatal termination takes place, generally from the third to the sixth day, preceded by the symptoms ushering in dissolution from intestinal peritonitis.

21. *D. Inflammation of the pericæcal tissue* is occasionally met with. Several interesting cases of it have been published by French writers, especially by MM. DUPUYTREN and MENIÈRE. Mr. CORLEAND has detailed a case where a urinary

calculus was extracted from an abscess which opened externally, and communicated internally with the cavity of the cæcum. It is probable that the calculus, in passing along the ureter, had produced inflammation, extending to the cellular tissue exterior to the cæcum, and terminating in abscess, which had opened in both directions. In a case contained in Dr. JOHNSON's Journal, abscess had formed in the cellular tissue, external to the cæcum, had also burst into this viscus, and pointed externally: and a similar instance is recorded by M. DUPLAY. In all these a sinuous communication between the cavity of the intestine and external surface was formed. Several of the cases of inflammation of the cæcum and connecting tissue, detailed or referred to by M. MENIÈRE, terminated in suppuration, and opened either internally or in the right iliac fossa. In some of those published by M. DUPUYTREN, the purulent matter had infiltrated itself as high as the kidney, and as low in the pelvis as to collect between the rectum and bladder.

22. The *precursory symptoms* of this state of disease belong to pathological changes in the functions or coats of the cæcum itself, and are often similar to those already described as indicating acute or chronic inflammation of its mucous surface and follicles; the disease in such cases most probably arising from ulcerative perforation of the coats of the organ, or the extension of inflammation from its mucous surface. The patient frequently is first affected with either diarrhoea or constipation, or by both alternately, with colicky pains shooting in various directions, but generally radiating from the right iliac region; and he complains of pain or tenderness on pressure. To the above symptoms, others sooner or later are added, especially tumefaction, and constant pain in this part, and in the right iliac fossa, with anorexia, nausea, fever, and an irregular state of the bowels. As soon as suppuration commences, the disease presents the local and constitutional characters usually accompanying the formation of matter, with more or less tumour, which is generally situated deep in the iliac fossa.

23. Inflammation in this situation will, if recognised early and treated judiciously, terminate by resolution, in perhaps the majority of cases. But suppuration is almost as common a termination as resolution; and when it takes place, the abscess formed most frequently opens internally. In several instances, peritonitis has supervened, either previously or subsequently to suppuration, but more usually the latter. The abscess may also open externally, as in the cases already referred to; but seldom without it having also previously established a communication with the cavity of the cæcum.

24. *iii. CHRONIC INFLAMMATION OF THE CÆCUM* generally comes on primarily, slowly, and insidiously, and may be long limited to the internal surface and follicles of the intestine, as noticed above (§ 17.). It more rarely remains after acute attacks. In the former mode of appearance, it often advances imperceptibly, until serious organic changes have taken place in the coats of the organ; the general health, although more or less affected, not being so far injured as to alarm the patient. In its progress, it sometimes presents occasional accessions of severity, and even assumes

a sub-acute form. In other cases, an acute attack is superinduced, which may terminate in peritonitis, or in suppuration, or even in gangrene. Chronic inflammation is the most common organic state of disease by which the cæcum is affected.

25. *A. Causes.*—This form of inflammation of the cæcum is, I believe, most frequent in females, probably owing to contingencies connected with the uterine functions and child-bearing, and to their modes of dress. It often occurs among them previously to menstruation, or soon after the climacteric epoch. The use of unripe or acerb fruits; sedentary occupations, or want of exercise; the depressing passions; previous disorder of the digestive organs, particularly costiveness, and habitually, or occasionally, deferring the earlier intimations to evacuate the bowels; suppression of accustomed discharges, especially the hæmorrhoidal, the menstrual, and lochial; the pressure of an ill-constructed bandage for hernia; blows or contusions on the cæcal region; and occasionally too violent exercise on foot or on horseback; are its most usual exciting causes.

26. *B. Symptoms.*—At first the general health and strength are not much injured; but the patient loses his healthy appearance, and activity. He complains of colicky pains occurring occasionally, or even periodically, in the right iliac region, shooting through the abdomen, and recurring soon after a meal. The appetite is not materially affected, and flatulence is the most constant gastric symptom. The tongue is generally red at its point and edges, and loaded at its root; sickness and vomiting are not present; the pulse is often little affected, or it is quick and small; the patient lies on the right side, with the body bent and the thighs drawn up, and feels pain or uneasiness in the iliac region on turning to the left side, which is increased by continuing the position. The alvine evacuations are irregular and offensive, being at one time frequent, at another retained, generally muco-feculent, fluid, preceded by colic or slight tormina, and affording little relief. The abdomen, on examination, presents little remarkable, until we reach the cæcal region, where pressure occasions uneasiness, and a deeply seated fulness and hardness are usually detected. If much fulness or distension be present, the urine is generally voided frequently, and slight pain or numbness of the right thigh, with œdema of the right ankle, is often felt. If the disease go on to ulceration, blood will appear in the stools, which will also be of a more or less dark colour. Such are the usual symptoms, until some one of the acute states of the disease supervenes, when their attendant phenomena will indicate the change.

27. *C. The chronic state of the disease may give rise to very great thickening of the parietes of the cæcum, either with or without dilatation of its cavity, and ulcerations in its internal surface.* FABRICIUS HILDANUS describes a case of this kind as one of cancerous ulceration; but it seems rather to have been chronic inflammation, with thickening and ulceration. Dr. BREZELLY has detailed an interesting case very nearly of this description, wherein these changes were very remarkable. The patient complained of colic, constipation, flatulence, mucous bloody stools, and of a large tumour in the iliac region, which was mistaken for aneurism of

the iliac artery. On inspection, *post mortem*, the coats of the cæcum were found above an inch in thickness, scirrhus, inflamed, ulcerated, perforated, and its cavity enlarged. When the disease has gone on to thickening, as indicated by the obscure hardness, and tumour, uneasiness, &c. in the iliac region, particularly if it be attended with ulceration, as may be inferred from the presence of small quantities of blood or pus mixed in fluid, or but little consistent, muco-feculent and offensive stools, amendment is procured with great difficulty, under the most favourable circumstances; but it should not be despaired of, although it may be long in appearing. I have met with severe cases, obviously of this description, where medical treatment was persisted in for many months, and one or two for some years, yet ultimately the health was re-established. In a case recorded by M. EULARY, the cæcum was remarkably constricted, and the appendix filled with fæces. The patient died of ileus.

28. *IV. COMPLICATIONS.*—Inflammations of the cæcum, particularly of its internal surface, and in their sub-acute and chronic forms, with morbid enlargement and fungous ulceration of its follicles, are very frequently associated with dysentery and fever, in both temperate and warm climates. Inflammation of its external connecting tissue is much less common in these complications. I ascertained the fact of the intimate connection of inflammations of the cæcum with dysentery, in 1816, my attention having been first directed to it by the case already alluded to (§ 15.). Indeed, they generally constitute the original disease in dysentery; the irritative state of inflammation of the mucous surface and follicles of this viscus, together with the acrid secretions and other matters retained in it, producing an excoiating state of the discharges, whereby the cæcum itself is first affected, and subsequently those parts of the colon and rectum where they are the longest retained; an opposite morbid relation, however, obtains in respect of its complications with fevers, particularly those of a typhoid nature; for, while in dysentery it is frequently the primary affection, in fevers it is commonly a consecutive lesion arising from the morbid states of the secretions and matters, either retained in or passing through it, and from the disposition to change possessed by the mucous tissues and follicles during these diseases, particularly those of an asthenic character. It should not, however, be overlooked, that lesions of the cæcum may also arise in the course of dysentery, owing to similar states of the secretions and mucous surface of the intestines as are present in fevers; and that the cæcal disease will very generally escape detection during life, particularly in fevers, unless the attention of the practitioner is alive to its occurrence. In every case, therefore, should the region of this viscus be attentively examined; and, if symptoms indicating an affection of it be present, the means of cure should be directed accordingly.

29. *V. LACERATION, or rupture of the cæcum occurs in rare cases, either in consequence of previous disease and infarction of its cavity, or of external injury.* Some instances of this occurrence are to be found in early volumes of the Philosophical Transactions, and in the Transactions of foreign medical societies. SOEMMERING, in his notes to the translation of Dr. BAILLIE'S

Morbid Anatomy, mentions a case wherein it was produced by vomiting, which may have arisen from accumulation of morbid matters in the cæcum, with obstruction of its canal, and ulceration of its internal surface. Mr. SREER and Mr. SHEWARD record instances of its rupture from contusion, — an event which is very likely to occur when an injury is sustained over it during distension of its cavity, from whatever cause. The consequence of its laceration generally is rapidly developed, and speedily fatal, peritonitis. *Introsusceptions* of this part, itself having passed into the colon, or portions of bowel having passed into it, are not infrequent, particularly in young subjects; but they require no particular notice, farther than as a cause of *ileus*, inflammation of *intestines*, &c.

30. vi. The Prognosis in disease of the cæcum is very different in each of its forms. — *a.* When the *internal surface* is chiefly affected, recovery will take place in most of the cases, unless ulceration has commenced; and even then a favourable issue will sometimes follow judicious medical treatment and regimen. *b.* In the *acute states* of inflammation affecting the more external coats of the viscus, the prognosis is upon the whole unfavourable, at least it should be stated as such to the friends of the patient; and in every case it should be given with caution. *c.* If we suspect, from the severity of the symptoms, or from the rapid extension of inflammation from the cæcal region over the abdomen, that the *appendix is inflamed*, it is still more unfavourable; if, in addition to this circumstance, the retching be frequent, and more particularly if the matters ejected appear as having come from the small intestines, we may infer, not only that the cæcum or its appendage is most acutely inflamed, but also that either its canal is obstructed, or some adjoining part of the tube is strangulated; — in either case the prognosis is most unfavourable. The subsequent appearance of the symptoms usually indicating gangrene of the intestines leaves no hope, and is soon followed by dissolution. *d.* When considerable tumour, seated in the iliac fossa, and the signs of inflammation of the *pericæcal tissues*, are present (§22.), a favourable opinion of the issue may be entertained, if active treatment have been employed early in the disease, and the patient's constitution be not in fault. But in very many such cases, the general health has been much impaired previously to this disease, and has even predisposed to the attack. In such cases, as well as when evidence of the formation of *abscess* is observed, a very unfavourable, or at least a very cautious, prognosis ought to be given. *e.* In the *chronic states* of the disease any opinion should be offered with much reservation. If the disease have come on slowly, continued long, and the stools present the appearances indicating ulceration (§26.), an unfavourable state of disease exists; thickening of the coats of the viscus merely (§27.) is more favourable, but is not readily removed. *f.* The *complications* of this disease (§28.), particularly with typhoid fever, are attended by considerable danger. The association of it with dysentery is productive of the worst forms of that disease, as well as its complication with fever, of its most dangerous states; and causes the former to assume a chronic and obstinate form. *g.* *Lacera-*

tion, or rupture of the coats of the cæcum, is generally fatal in its results.

31. vii. TREATMENT. — *A.* Inflammation of the *internal surface* of the cæcum, and the *chronic states* of the disease (§17.24.), require the application of a number of leeches either near the iliac region, or on the inside of the right thigh, and a repetition of them according to the circumstances of the case. In robust or plethoric persons, general depletion may precede the local. After the leeches are removed, fomentations and a succession of poultices will be found serviceable; after which, a full dose of calomel with James's powder, and, a few hours subsequently, a mild aperient medicine, should be exhibited, and an aperient action promoted by the administration, and frequent repetition, of demulcent, oleaginous, or sa; onaceous enemata (§13.). Drastic purgatives are seldom more efficacious than those of a milder kind, but are often attended with risk. I have generally found the infusion of rhubarb, with tartrate of potash, and the electuaries prescribed in the *Appendix* (F. 82.89.98.), most serviceable. In the majority of cases, the above means will remove all ailment. The treatment in other respects should be the same as is recommended in chronic *Diarrhœa* and in *Dysentery*. If functional disorder remain after the more inflammatory symptoms have subsided, a blister may be applied, or a deobstruent liniment (§13.) rubbed over the cæcal region night and morning; or a rubefacient and deobstruent plaster (§14.), worn for some months in this situation.

32. *B.* In the *more acute states* of the disease, general blood-letting, repeated according to the circumstances of the case, or followed by local depletions, and the same treatment subsequently as described above, must be early and decidedly employed. If there be vomiting, or retchings upon taking substances into the stomach, a large dose of calomel, — generally from 10 to 20 grains given either alone or with one or two grains of opium, — will allay this disorder. If the symptoms still continue, or if they be but slightly mitigated, blood-letting, general and local, followed by fomentations, poultices, and oleaginous enemata, having been carried as far as may be deemed prudent, the turpentine embrocation, (lannel cloths wrung dry out of very hot water, and immediately soaked with spirits of turpentine,) should be applied over the abdomen and retained there as long as it can be borne by the patient. If the tormina be severe, or if peritonitis have supervened, this is, after depletions have been practised with decision, the most efficacious means we possess. In a case of this disease, which had become complicated with peritonitis, a member of the family of a medical friend, this means gave almost instant relief, after other measures had been carried to the utmost limits, and the patient soon afterwards recovered. In another instance of extreme danger similarly complicated, which very recently occurred, the repetition of this treatment removed all complaint, although resorted to in despair of success from it.

33. *C.* I have stated that *inflammation of the appendix cæci*, particularly when occasioned by hard bodies having passed into it, often does not extend to the cæcum itself, or, at most, only to its peritoneal coat, in common with the adjoining portions of this surface; but that the supervention,

the extension, and fatal termination of peritonitis in such cases are most rapid and dangerous, the appendix itself generally soon becoming gangrenous. It therefore behoves the practitioner to have recourse to the most decided measures, when he finds the symptoms of peritonitis originate in the cæcal region, and when retchings come on. Vascular depletion, and all the remedies already noticed, must be energetically and early employed; but premature attempts should not be made to evacuate the bowels, otherwise their action will be inverted, and decided symptoms of ileus will be produced. Fomentations should follow the leeches; and afterwards hot poultices should follow; which in their turn ought to give place to the terebinthinate embrocation, if requisite. A large dose of calomel and opium should, however, be given after the first full blood-letting; this will generally be retained, even in the worst cases; and it ought to be repeated according to circumstances, without fear of affecting the system by it,—an effect which it is even very desirable to produce. Little other medicine need be exhibited by the mouth, excepting draughts with nitrate of potash, or sub-carbonate of soda, or both, with agreeable demulcents and emollients, if the stomach will retain them. But the assiduous administration of *enemata* must not be neglected. It is entirely by their agency in this state of disease, that the bowels are to be evacuated, when it is judged prudent to fulfil this intention, which should seldom be omitted as far as they are calculated to accomplish it; more especially after depletions have been practised. The *enemata* prescribed in the *Appendix* (F. 130–151.), as they may appear suited to particular cases, may be employed. Pain, tormina, nausea, or vomiting, having been relieved, gentle cooling aperients, and in the interval diaphoretic medicines, may be exhibited by the mouth. Warm baths are seldom of much use in this malady: but when they will not interfere with the treatment prescribed, they may be tried, particularly in the more advanced periods. After the disease has been removed, and merely functional disorder remains, the measures already advised may be put in practice.

34. *D.* The treatment now described is also applicable to the early stages of inflammation affecting the *pericæcal tissues*. If suppuration takes place, the treatment recommended for *Abscess* must be resorted to; taking care to support the energies of life under it, particularly when the constitution or general health is in fault. If we suspect either the existence of *ulceration* or of *thickening* of the coat of the viscus (§ 27.), the assiduous employment of the liniments noticed above; of gentle aperients and deobstruents, particularly the infusion of rhubarb with soda or potash; of electuaries, with sulphur, cream of tartar and soda, or the sub-borate of soda; small doses of blue pill or hydr. cum creta, with ipecacuanha, hyoscyamus, and camphor; repeated blistering, and subsequently the deobstruent plasters; the frequent use of large oleaginous, saponaceous, and demulcent *enemata*, with the treatment recommended in chronic *dysentery*; are the measures most to be depended upon; with strict attention to diet, which should be chiefly farinaceous, to the state of the digestive organs generally, and to the secretions and excretions.

35. *E.* The complication of the disease with *dysentery* requires, in addition to the measures used for that disease, the application of leeches near the right iliac region, and the other external measures already noticed, with rhubarb aperients, combined with camphor, narcotics, and ipecacuanha; laxatives, with demulcents and anodynes; the frequent administration of oleaginous and emollient *enemata*; and the usual means of correcting the secretions, and diluting and carrying off the acrid and exoriating fluids, and fecal matters in the intestinal canal. (See *Dysentery—its Treatment*.) A similar treatment to the above is necessary when the disease occurs in the progress of *fever*. Depletions, however, are generally not so well borne in this complication as in the former, and should therefore be carried to a less extent; but all the external remedies, and the use of laxatives, particularly those imparting a tonic effect to the intestinal mucous surface, should be often employed. Camphor, with hydrarg. cum creta and opium, or with ipecacuanha and rhubarb, terebinthinate injections, or even a terebinthinate draught in the worst cases, have proved most serviceable in this state of complication, in my practice. During recovery, the occasional use of the liniments and plasters above referred to, attention to the secreting and digestive functions, particularly to the state of the bowels, which should be occasionally assisted by emollient and laxative injections; and a regulated diet, easy travelling, change of air and of scene; are the chief measures requiring attention. (See the treatment of *FEVER*.)

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CALCULI. See CONCRETIONS, *Biliary and Intestinal*; also URINARY CALCULI, and URINE.)

CANCER. SYN. *Scirrhus*, *Carcinus*, *Schirrocancer*, *Carcinoma*, *Acut. Var. Cancer*, *Fr. Das Krebsgeschwür*, *Ger. Scirr, Cancbero, Cancro*, *Ital.*

CLASSIF. 4. Class, Local Diseases; 6. Order, Tumours (Cullen). 3. Class, Sanguineous Diseases; 4. Order, Cachexies (Good). IV. CLASS, IV. ORDER (Author, see Preface).

1. DEFIN. A disease often arising from hereditary predisposition, in the middle or advanced periods of life; commencing with a local hardness,

which subsequently softens in its centre, infects the adjoining parts, and ultimately contaminates the frame.

2. Cancer consists of two states or stages: the first, in which it presents the appearances usually denominated *scirrhus*; the second, in which it softens, ulcerates, &c., and degenerates into true cancer, or *carcinoma*. I shall describe each of these successively.

3. I. SCIRRHOUS STAGE. — *Occult cancer*. It commences with a tumour, a limited local hardness; is usually single; is very rarely, at its commencement, detected in different parts at once; and is not surrounded by a cyst. Several authors have stated the occurrence of a cyst; but OTTO more accurately excludes it from this structure. It is of importance to attend to the appearances of the disease at its commencement, as serving to indicate its nature. It is distinguished, at this period, by hardness, coldness, whiteness or paleness, insensibility, and deficiency of red blood vessels; — a state indicating the low grade of vital endowment of the part.

4. The scirrhous structure, when fully developed, consists of a firm, hard, rugged, incompressible, and unequal mass, the limits of which are not distinctly defined. Its colour is generally of a light grey, and when cut into thin slices, it is semi-transparent. Upon close inspection, it is found to consist of two distinct substances; — the one hard, fibrous, and organised; the other soft, and apparently inorganic. The former composes the chief part of the diseased mass, and consists of septa, which are opaque, of a paler colour than the soft part, unequal in their length, breadth, and thickness, disposed in various directions; sometimes forming a nearly solid mass; in other instances, a number of cells or irregular cavities, which contain the soft part. This latter is sometimes semi-transparent of a bluish colour, and of the consistence of softened glue; at other times more opaque, softer, somewhat oleaginous, and like cream in colour and consistence.

5. The fibrous structure seems to be the cellular, or proper tissue of the part, in a state of induration and hypertrophy; assuming, in consequence of its increased density and bulk, an appearance similar to the fibrous or fibro-cartilaginous structure; whilst the softer portion, contained in the meshes and cells of the former, appears to be merely a morbid secretion poured out by the vessels nourishing the organised fibrous tissue, and is probably the exhalation of the part, either secreted in a modified state, or accumulated and changed by the disease of its containing structure. If this view be correct, the former, or organised part, may be considered as chiefly resulting from an altered state of nutrition in the seat of disease; whilst the latter, or inorganised portion, may be viewed as proceeding from a morbid secretion, — the diseased structure thus being a product of a disordered state of both the nutritive and secreting functions, most probably in consequence of alteration of the vital influence exerted by the ganglionic nerves on the capillaries of the part.

6. The proportion of each of those two substances, and the modes of their distribution, vary very considerably in different scirrhous masses. This diversity seems to be owing to the different tissues in which they are developed, and to the

modifications arising from temperament, local irritation, and various concurrent circumstances to which the patient may have been exposed. It has been attempted by Mr. ABERNETHY to arrange these varieties of scirrhous into species, and to designate them according to the natural structures which they most resemble. Thus he divides them into Mammary, Pancreatic, Tuberculous, &c.; but these different states of structure glide so insensibly into each other, and are so perfectly similar as respects their origin and consequences, that little practical advantage is derived from thus distinguishing them.

7. In some scirrhous tumours, the fibrous part of their structure is both most conspicuous and abundant, and is condensed into a solid mass, having the appearance of a centre or nucleus, whence radiate numerous septa in every direction. This is the most common appearance of the disease. In other instances, the tumour forms an uniformly hard mass, of an irregular shape, and of no very defined structure. In some cases, the organised part approaches more nearly to the cellular structure, its cells being filled with a soft matter which may be pressed out. Occasionally, cysts are formed within the tumour, of various sizes, containing a reddish, reddish brown, or a chocolate-coloured fluid. These cysts are lined by a smooth membrane, from which a fungous tumour sometimes sprouts out. In some instances, portions of the scirrhous mass are converted into a hard substance resembling cartilage, in which bony or calcareous depositions are occasionally found. When the scirrhous structure is formed in the substance of a gland, its limits cannot generally be accurately determined, the two structures apparently being inseparably connected. In some cases, the scirrhous tumour condenses the cellular tissue surrounding it, and hence it acquires a somewhat sacculated appearance. (WARDROP.)

8. At the commencement of scirrhous disease, the structure of the tissue or organ in which it is seated preserves for some time its aspect and colour, being changed merely in volume and density: sometimes, however, its volume is but little augmented, whilst its density is very much increased. As the disease advances, the proper tissue of the organ becomes more obscure, and verges nearer to that already described.

9. M. HECHE, of Strasbourg, analysed a portion of fully developed scirrhous of the mamma, and found 72 grains composed of 2 grains of albumen, 20 of gelatine, 20 of fibrine, 10 of a fluid fatty matter, and 20 of water and loss. He likewise analysed, by a similar process, 72 grains of scirrhous uterus, and found it to consist of 15 grains of gelatine, 10 of fibrine, 10 of oily or fatty matter, and 35 of water and loss. (LOBSTEIN, *Anat. Path.* t. i. p. 403.)

10. Scirrhous tumours do not always remain in the state now described; and the period during which they thus continue is not determinate. When once they commence, they seldom retrograde, and the part affected never is restored to its healthy state. It is chiefly in this respect that the early stages of scirrhous differ from simple induration proceeding from chronic inflammation. Scirrhous may remain nearly stationary for several years, occasioning but little constitutional disturbance; but generally an important

change takes place in its structure, and the disease afterwards makes rapid progress.

11. II. CARCINOMATOUS, or CANCEROUS STAGE. — *Open or ulcerated cancer.* After a time, portions of the scirrhous mass begin to soften, and pass into a state of unhealthy suppuration and ulceration, — unhealthy as respects the characters and progress of these processes, and their contaminating influence upon the whole frame. The soft or inorganic substance resolves itself into a thin ichorous matter, very different from pus; and disorganisation commences, generally about the centre of the mass, and extending towards that part of it which is nearest either the surface of the body or any of the natural openings. When this process commences, it is in that state which has been denominated CARCINOMA, or CANCER. When this change takes place, the diseased mass seldom increases much in bulk, but is destroyed by an ulcerative process. The disease now makes rapid progress, owing to the contamination of the adjoining structures by the morbid matter secreted by the ulcerating part, a portion of which matter is evidently absorbed, irritating the lymphatic glands, and vitiating the whole frame. In consequence of this infection, the powers of life sink, the soft solids become cachectic, and the progress of the local affection accelerated. At last the patient sinks from the contamination of the circulating fluids, and the different textures of the body; the blood being diminished in quantity, as well as otherwise altered.

12. When the skin covering a scirrhous tumour ulcerates, a fungus of a cauliflower appearance, and hard gristly structure, sometimes proceeds from the surface of the mass. In some cases, ulceration destroys both the fungus and the primary tumour. It has been observed by Sir E. HUME, that some cancerous sores have suddenly changed from a painful and malignant character, to a more healthy aspect at some part, and even have begun to cicatrize. This apparent amendment is never permanent, for, sooner or later, the ulcerative process is renewed, and the disease pursues its usual course. Dr. PARR (*Dict. vol. i.*) states, that he has seen several cases thus terminate spontaneously; but the patients were all soon afterwards cut off by internal disease; probably consisting of the internal development, or metastasis of the malady, cases of which occurrence are not infrequent. (See *Journ. Hebdom. t. i. p. 323.* for a case wherein internal cancer appeared after the removal of the external disease by compression.)

13. Cancerous tumours generally contaminate the glands in the vicinity, particularly after ulceration has commenced. But these glands are seldom primarily affected. Mr. WANDER states, in his excellent description of this disease, that he has only met with two cases of primary affection of the lymphatic glands. Besides these glands, various other organs and parts, sometimes far removed from the seat of the primary disease, become secondarily affected. This is most probably occasioned by contamination of the frame, from absorption of the morbid matter of the disease. Sometimes the existence of cancer in distant organs is not successive or secondary, but seemingly coeval. In this case the cause must be looked for in the originally morbid state of the system. Indeed, this state always obtains, to a certain extent; the disease being strictly constitutional even

in its origin; the consecutive contamination, arising from the absorption of morbid matter from the primary tumour, merely augmenting the original vice, and accelerating its noxious effects.

14. Scirrho-cancer most commonly *originates* in glands whose functions have been interrupted, or that have never performed the offices intended for them; or it affects parts which have been previously diseased, or have received at some period an external injury. Thus it attacks the mammae, the uterus, the ovaria, the testes, the thyroid glands. It also very frequently commences in the tegumental, and the digestive, and urino-genital mucous surfaces; more particularly in the skin of the face; in the mucous membrane of the nose, lips, mouth, pharynx, and œsophagus; in the stomach, especially the pylorus and cardia; in the intestinal canal, the ileo-cæcal valve, rectum, and anus, and in the urinary bladder. The viscera which are *secondarily* affected, are commonly the lungs, bronchial glands, the liver, the omentum, the mesentery, the spleen, the pancreas, the brain, the medulla of the bones, and the skin. Several of these, particularly the liver, pancreas, mesentery, brain, &c. may also be primarily or coevally affected with other parts. Scirrhous affects the skin in two forms; — the one is that of wart, the other that of tubercle — the former being primary, the latter secondary.

15. III. *Diagnosis.* — It is of great importance to be able to distinguish between this disease and various others, for which it is liable to be mistaken. For instance, the simple induration proceeding from chronic inflammation has, in several instances which have come to my knowledge, been mistaken for scirrhous. This mistake not infrequently occurs in respect of induration of the neck of the uterus.

16. *A. In simple induration*, the part affected is redder, more injected, retains more of its original structure, is less indurated, and less lobulated, than scirrhous. The parts also surrounding the indurated portion are frequently slightly infiltrated with serum. Induration, the result of inflammatory action, admits of resolution, and entirely disappears, sometimes in consequence of a natural flux or evacuation, of active exercise, the return of accustomed discharges, or pregnancy. Thus the men-trual flux sometimes dissipates inflammatory induration of the mammae, or of the neck of the uterus.

17. *B. The fibrous production* generally appears in the form of a rounded body, implanted, but isolated, in the proper structure of the organ, and adhering to it merely by means of laminated tissue. Upon dividing this structure, it grates under the scalpel; and it sometimes presents dilated vessels, which are never observed in scirrhous masses: moreover, it occasions little or no pain, and never passes into the cancerous state.

18. *C. Compared with tubercular or lardaceous productions*, scirrho-cancer offers remarkable differences: — 1st, This latter is never found isolated in the cellular tissue, or in the parenchyma of organs, in the form of granulations, or of small rounded tumours, as the tubercular formations are; nor in largely diffused masses, as the lardaceous substance: 2d, It is never enclosed in a cyst: 3d, It does not greatly increase the volume of the part it affects; sometimes the part is even

diminished, but much more dense: 4th, It is not susceptible of the same kind of softening as the tubercular and lardaceous productions; but rather of a peculiar rarefaction, passing into a peculiar form of fungus, followed by the development of blood-vessels: 5th, Its vital properties are excited, and its sensibility becomes exalted, as the disease advances, — circumstances which are never observed in connection with these productions.

19. *D. Cancerous ulceration* is characterised by a jagged, thick, soft edge, which is turned outwards. The surface of the ulcer is greyish, or greyish brown, sometimes livid brown, elevated into loose, fungous vegetations, discharging a foetid, corroding sanies or ichor, and bleeding slightly upon irritation. *a. Chronic inflammatory ulcers* differ from the former in the absence of a foetid corroding ichor; in the hardness of their margin, which turns inwards; and in the reddish and more healthy appearance of their bottoms, which in cancer is colourless, or a livid brown, hard, irregular, fungous, sometimes with cauliflower excrescences, and extremely offensive. *b. Local tumours* sometimes appear, particularly on the tongue, originating in irritation, and exasperated by the continuance of this cause. These usually commence with a small pimple or wart, becoming more and more hard and irritable as they increase, until they assume a scirrhus-like induration. They seldom endanger the constitution, yet appear sometimes to assume a malignant character. (Mr. EARLE, in *Trans. of Med. Chir. Soc.* vol. vi. art. 22.)

20. *E.* As soon as the *carcinomatous change* takes place in the scirrhus mass, the disease involves adjoining parts, and the system generally. The local suffering is more fully developed, and the vital actions of the part are changed greatly from the healthy course. The sensibility is morbidly augmented in short paroxysms; the pain being violent, and what is usually called *lancinating* or stinging during the exacerbations, but often slight, or almost altogether absent in the intervals. If the surface be exposed, the pain is burning, and the part is always sore. As the disease advances, and particularly as the ulceration proceeds, the paroxysms of lancinating and burning pains increase in violence, and the remissions become more imperfect, and of shorter duration. The *cancerous sanies* is generally very fluid; but its appearance varies with the treatment, the situation of the disease, and with the diet of the patient. It is generally of a greyish white, or reddish grey; it slightly effervesces with sulphuric acid, and turns syrup of violets to green.

21. *F.* The *extension and contamination* of the system characterising cancerous ulceration appear to be owing, 1st, to the corroding influence of the secretion on the parts with which it is in contact: 2d, to the absorption of a portion of the morbid secretion by the lymphatic vessels: this is evinced by the swelling and affection of the glands in the vicinity of the primary disease. But the affection of the glands may not be altogether owing to the absorption of the morbid matter, but partly to the irritation of the lymphatic vessels occasioned by the disease of the part in which they originate: and, 3d, to the absorbing function of the veins, according to the researches of MAYER, M'GENDIE, TRIEDEMANN, GRIELIN, &c. These different sources of contamination seem more than sufficient

to account for the general cancerous cachexia characterising the advanced stages of the disease.

22. *G.* The characters of this *cancerous cachexia* are, emaciation; softness and flaccidity of the soft solids; œdema of the extremities; hectic fever; a peculiar change of the complexion and colour of the whole surface of the body, which become of a pale leaden, or pale straw colour, or waxy hue; and general depravation of the functions. This state of cachexia increases with the progress of the disease, and augments at the same time the primary local change. It is rapidly developed and increased when the scirrhus mass ulcerates, when also carcinomatous tumours frequently manifest themselves in various parts of the body. Ultimately the circulating fluid is deficient in quantity, and is poor and morbid; and the vital cohesion of the soft solids, and even of the bones, is diminished.

23. *IV. CAUSES.* — Scirrhus, like scrofula, is undoubtedly an hereditary malarly. Instances are numerous of several individuals in the same family having been affected by it. It is almost altogether confined to persons advanced in life. Cases of the disease are very rare before the age of thirty. Sir A. COOPER met with it only twice previously to this age. Mr. WARDROP has seen one instance of it in the skin of a girl of twelve years. Females, owing to the liability of their appropriate organs to be attacked, are more subject to it than males; especially those who have not borne children, the disease generally appearing in them upon the cessation of the catamenia. The disease seems commonly to result from an original or acquired diathesis, existing previously to the development of morbid structure, and very often connected with the lymphatic temperament. MM. BARCNET and FERRUS found 23 instances of this temperament prominently marked, out of 44 cases of the disease. Anxiety and distress of mind, and all the depressing passions, are most disposing causes, particularly to cancer of the breast. An inactive state of the part for a considerable time previously; a poor, unwholesome diet; laborious and exhausting occupations, and an unhealthy locality; also dispose to it.

24. It is generally *excited* by blows and external injuries; by repeated or continued irritation; the abuse of spirituous liquors; and by low and poor diet. It is not liable to be propagated by contagion; the experiments of MM. ALIBERT, BRIET, and DUPUYTREN, having shown that the matter discharged from a cancerous ulcer cannot produce the disease in another person. Although irritating agents of any description may give occasion to its appearance, yet there must have previously existed cancerous diathesis, or constitutional disposition, in which it almost always originates.

25. The *proximate cause* of this dreadful disease is extremely obscure; and opinions respecting it have consequently been numerous. SCHAEFFER and GAMER consider it to be caused by a singular depravation of the nervous fluid. Dr. ADAMS and Dr. BARON impute it to the existence of an hydatiform body, which they call the *hydatis carcinomatosa*; and Mr. CARMICHAEL, to a body enjoying an independent state of existence developed in those parts of the frame, the vitality of which is enfeebled, and the organised matter of which begins to be decomposed. He supposes that, at first, this constituent of cancer occupies but a minute spot,

consists of a substance nearly similar to cartilage; and that it afterwards extends itself in the form of radiations, resembling ligaments formed by thickened cellular tissue. These opinions, which are not essentially different from each other, have been completely refuted by BURNS, CLERT, and HIRMLY. According to M. BROUSSAIS, scirrhus-cancer is the result of an inflammatory or sub-inflammatory state of the vessels (*Examen des Doctrines Méd. t. i. prop. 93—95.*); and the opinions of M. M. BEGIN, BRESCHET, and FERRUS (*Dict. de Méd. t. iv. p. 133.*), differ but little from that of M. BROUSSAIS. They impute the disease to irritation of an inflammatory nature, occasioning the secretion of a coagulable lymph that becomes condensed into a scirrhus substance, which may remain stationary for a longer or shorter period, but which sooner or later undergoes a secondary inflammatory process, and experiences softening and disorganisation, with various other changes, as these processes proceed. To this doctrine of the modern French pathologists it may be objected, that scirrhus furnishes no sign, local or general, of inflammation, and yet it goes on increasing; and if it can increase rapidly without inflammation, may it not also originate independently of this cause? Where, therefore, neither the local appearances, nor the usual consequences, nor the constitutional symptoms, of inflammation can be perceived, ought we to impute disease to this state of vascular action? The inference is obvious; but it is only one of many arguments, which, if they were not superfluous, might be adduced against the doctrine.

26. According to M. ANDRAL, cancer is not a specific alteration, but a state of disease arising from lesions of nutrition and secretion, which have reached the period of their termination in ulceration; the ulcer thus arising, constantly increasing either in depth or extent of surface, without any disposition to cicatrization. Thus, M. ANDRAL considers cancer in a generic acceptation, and comprises under it the ulcerative process in various species of disease of a constitutional origin and malignant nature, which, although always considered as closely allied, in their origin, nature, and tendency, to scirrhus, have usually been viewed as distinct maladies. This opinion is more in accordance with the wide signification of the term *cancer*, in the writings of French pathologists, but is very deficient in precision and applicability; inasmuch as it embraces the advanced states only of several organic changes, which, in their earlier periods especially, are very distinct from one another—distinct in causes, origin, the structures they principally attack, and in their appearances and properties. I have, therefore, adopted the more accurate views of British pathologists respecting this disease, which I consider in relation to its predisposing and exciting causes, to the states of the system in which it occurs, to its local appearances, and constitutional effects; to the results of treatment, and to the ultimate changes produced in the blood, and in the various structures, as essentially depending upon a weakened and otherwise morbid state of the system generally; and arising from depravation of the vital conditions of the part affected, whereby its nutrition, nervous sensibility, and secreting function, become specifically changed, and all the fluids and solids ultimately contaminated.

27. V. TREATMENT.—The conclusion now drawn respecting the nature and morbid relations of *scirrhus-cancer* must render very apparent the futility of various measures which have been employed to remove it. Some writers have too exclusively viewed the disease as local; and thus, even in its advanced stages, resorted to most dangerous and painful operations to extirpate an evil, which, instead of being local, proceeds from the morbid state of the system generally, and which all depressing causes (the surgical operation itself being one) rapidly increase, disposing not only to its extension in its primary seat, but also to its appearance in new situations and more vital organs. The means of cure, therefore, should have especial reference to the state of the constitution favouring its development and progress; for, when the malady is advanced, local measures can, at the best, only be palliative, and are there fore subsidiary to judiciously devised means employed internally, and assisted by suitable diet and regimen.

28. Before I proceed to state the indications which should guide the treatment of this disease, and the medicines which seem best calculated to fulfil them, as far as this is possible, I will take a brief view of the means which have been recommended or tried by preceding writers. The real importance of this subject to the physician will be the more obvious, when he reflects, that cancerous diseases are often—indeed most legitimately on all occasions—within his province, more particularly when they invade, as they frequently do, internal organs; and that the life of the patient may be greatly prolonged, and his sufferings much alleviated, by judicious medical treatment.

29. A. At the commencement of the scirrhus stage, various means have been employed, and sometimes with some advantage, according to the showing of those who employed them. *Conium* has, upon the whole, found the greatest number of supporters; and I think that, when it has been combined with the alkaline tonic and stomatic preparations, it has been often of considerable benefit. This seems to be nearly the opinion of several writers, and amongst others, of GISSNER (*Beobacht. b. i. p. 213., iii. p. 242.*), GIRARD, HUFELAND, (*Journ. der Pract. Heilk. b. ix. 3 st. p. 86.*), HANNEMANN (in *Ibid. b. ii. p. 473.*), and THILENIUS (*Med. und Chir. Bemerk. p. 100.*). ELECTRICITY and GALVANISM have been employed by BRISBANE (*Select Cases, &c. p. 36.*) and WALTHER (*Ueber die Ther. Ind. der Galv. Oper. &c. c. 12.*); the muriate of baryta, by HUFELAND; antimonials, by ROWLEY and DOWMANN; aconitum, by GREDING; digitalis, by MAYER (*Richter's Chirurg. Bibl. b. v. p. 531.*); laurel-water, by THILENIUS; mercury, particularly the corrosive sublimate, by RUYSCH, THILENIUS, and HARRIS; sal-ammoniacum, by JUSTAMOND; belladonna by GATAKER; and the mezereon, by HOME (*Clin. Exper. and Hist. p. 428.*), with more or less benefit, chiefly of a temporary kind in those cases which were obviously scirrhus, and with permanent service in those which were only supposed to be of this description.

30. B. In the more fully developed and less doubtful states of the disease, as well as in its earliest stage, a number of medicines have been recommended, and for a while have obtained some credit, which few of them have long retained. The great majority, however, of them have been

brought forward rather as palliatives, and with the view of keeping the disease in check, than as possessing the power of curing it; yet some have been exhibited with more sanguine expectations, particularly arsenic, conium, hyoscyamus, and belladonna. *a.* That conium is productive of benefit, when judiciously combined with other remedies, is manifest, notwithstanding the contradictory evidence respecting it. While we find STÖRCK (Lib. de Cicut. Vind. 1761. 8vo.), FOTHERGILL (Works, vol. ii. p. 47.), HAMILTON, FRANCKE (De Cancro. Jen. 1778.), NICOLSON (Med. Obs. and Enquir. vol. iv. n. 31.), QUARIN (De Cicuta, ch. 4. 5.), FEARON, BEIL (On Ulcers, pt. ii. sect. 8.), GRUELMANN (De Usu Cicuta, &c. Goet. 1785.), RENARD (Journ. de Med. t. xxiii. p. 411.), SCHAEFFER, and several other writers, in favour of it, we observe, SIEROLD (Chir. Tugeb. n. 74.), LANGE, HILL (Ed. Med. Comment. vol. i. p. 146.), AKKINSIDE (Trans. of Col. of Phys. vol. i. n. 6.) OBERTUEFFER, (Hufeland's Journ. b. ix. st. 3. p. 81.), SCHNEIDER (Chirurg. Gesch. b. iv. n. 19.), and BURNS, expressing opinions as to either its little efficacy, or its entire want of effect. This discrepancy may be accounted for upon the supposition of want of virtue in the preparations prescribed; the extract generally losing the virtues of the plant during the modes of preparing it formerly in use: and I find, upon referring to most of the authors now quoted, and to others not referred to, that the extract and decoction were usually employed by those who found it productive of no benefit; whilst the powdered leaves, the expressed juice of the plant, or an infusion of it, had been preferred by those who have expressed themselves in favour of it. I have prescribed the inspissated juice and powdered leaves of this plant, in several cases of internal scirrhus-cancer, in combination with the alkalies and tonics, and have always found them much more beneficial when associated with it.

31. *b.* Belladonna was first exhibited by ALBERTI (De Bellad. tanquam Specif. in Cancro, &c. Halæ, 1739.), who highly praised it in the occult stage of the disease. It was afterwards recommended by LAMBERGEN (Haller's Disp. Pract. ii. n. 41.), BRILOT, LENTIN (Beobacht. &c. n. 2. and 3.), AMOUREUX (Journ. de Méd. t. xiii. p. 47.), CAMPERDON (Ibid. t. iv. p. 342. 423–502.), SUYZEN (in Ibid. t. xxiv. p. 68.), and by GRANDVILLIERS (Ibid. t. xvi. p. 449.); and declared of little use by ZIMMERMANN and DE HAEN (Rat. Med. pt. ii. p. 37.). I believe, however, that some advantage will be procured from its internal and external use, particularly as a palliative, and when combined with medicines which are calculated to support the energies of life, and improve the secreting and digestive functions. A similar opinion may be offered respecting *hyoscyamus*.

32. *c.* There is, perhaps, no medicine which has been so commonly prescribed in this malady as *arsenic*. It forms the base of the several secret remedies, internal as well as external, employed by empirics; and has been very generally used by them as an escharotic, sometimes with very injurious effects, from being absorbed largely into the system. There can be no doubt, however, of its beneficial influence, in many cases, when cautiously prescribed, and judiciously combined

with other medicines; but chiefly as a most energetic tonic and excitant of the capillary vessels, and powerful detergent in the ulcerative stage of the disease. JUSTAMOND prescribed it both internally and externally, with opium and various other medicines; STARR (Archiv. f. d. Geburtsh. b. ii. p. 673.), RUSH (Edin. Med. Comment. vol. xi. p. 312.), and ODHUETIUS, state that they have found it cure incipient cancer, when applied in solution to the part; COLLENBUSCH (in Hufeland's Journ. d. Pract. Arzn. &c. b. iii. p. 103.) found it beneficial when employed externally, tonic extracts having been given internally at the same time; FISCHER (in Richter's Chir. Bibliog. b. viii. p. 76.), MICHAELIS (in Ibid. b. v. p. 132.), and REUSNER, prescribed it in the form of the powder of Guy* (composed of arsenic, sulphur, ranunculus sylvest., &c.), with marked benefit; SALMADE (Mém. de la Soc. d'Emulat. t. i. p. 152.) cured a case with the powder of Rousselot, the twenty-fifth part of which, he says, consists of arsenic; BALASCON DE TANARE gave it with the expressed juice of the solanum, and HORNUNG with serpentry and soot. This evidence, however, in its favour, is not without powerful opposition. FABRICIUS HILDANUS (Cent. vi. obs. 81.) says, that arsenic was introduced into practice by a monk named THEODORIC, in the tenth or eleventh century (having probably been made acquainted with in the West), and details cases in which he considered it detrimental. A similar opinion has been entertained of it by SCHNEIDER, THILLENUS (Med. und Chir. Bemerk. p. 101.), ACREL, MURRAY (Med. Pr. Bibl. b. iii. p. 485.), ADAMS, OBERTUEFFER (Stark's N. Archiv. b. iv. p. 673.), and DELIUS. Mr. HILL, however, expresses a very favourable opinion as to the effects of this mineral, and states that it will retard the progress of the true scirrhus tumour, in the great majority of cases, and often prevent it from becoming cancer (Ed. Med. and Surg. Journ. vol. vi. p. 58.). I believe that, when this medicine is cautiously employed, both internally and externally, in conjunction with narcotics and alkalies, or otherwise judiciously combined, Mr. HILL's opinion in its favour is not much too highly coloured.

33. *d.* The preparations of *mercury* are always injurious in this disease, when exhibited in any other manner than as an alterative, and, externally, as an astringent and stimulating wash. The oxy-muriate, in minute doses internally, with the muriate of ammonia, or the compound sarsaparilla decoction, the tinctures of cinchona, with guaiacum, &c., is often of service, at least in retarding the progress of its early stage; and when the disease has advanced to ulceration, the external use of the oxy-muriate, with the muriate of ammonia, lime water, &c. may occasionally be of some service. REIDIN (Cur. Med. Millen. n. 408.), states, that the preparations of this mineral are always injurious when productive of salivation. Of the accuracy of this opinion, there can be no doubt. Prescribed, however, as now recommended, it has received the approbation of MOSELEY, GOOCH, GMELIN (Method. Cancrum Sanandi, Tub. 1756.), HAGEN, GATAKER, CHAPUIS, BÜCHNER (De Med. Mercur. Usu in Cancro. Hal. 1755.),

* A secret remedy, recommended by RICHARD GUY, in a production, entitled *Essays on Scirrhus Tumours and Cancers*, 8vo. Lond. 1759.

CHAMPELLE (*Sur le Traitement du Cancer*. Par. an viii.), and by SIR A. COOPER (*Lectures*, in *Lancet*, vol. iii. p. 190.)

34. *e.* The preparations of iron have been recommended by JUSTAMOND and DE MARÉ (*Tract. Med. Chirurg. de Cancero*, &c. Vien. 8vo. 1767.), who gave them variously combined, particularly with muriate of ammonia, and in the state of neutral salts. Mr. CARMICHAEL strenuously advises the sub-phosphate, combined with a little pure fixed alkali. He prefers this preparation, but occasionally also employs the carbonate, the tartrate of iron and potash, the phosphate and oxyphosphate of the metal. If it occasion costiveness, he combines with it a little aloes; and, if it produce headach, fever, or full pulse, he leaves it off, and gives four grains of camphor every five hours. He prescribes it as follows; directing externally to ulcerated cancers, the carbonates, phosphates, or arseniate of iron, made into a thin paste with water; and to occult cancer a lotion constantly applied, consisting of a strong solution of some one of the salts of this metal.

No. 85. R. Sub-phosph. Ferri gr. xxx.—℞ ij; Potassæ vel Sodæ Puræ gr. iij.—v.; Extr. Aloës gr. iv.; Pulv. Glycyrrh. ℞ j; Albumen Ovi q. s. ut fiat Pilulæ xij. Capiat binas tertius vel quartis horis.

Besides these preparations, the *ferrum ammoniacum* is entitled to notice. It was considered the best medicine that could be directed against this disease by Dr. DENMAN (*Observ. on the Cure of Cancer*, p. 77.).

35. *f.* The preparations of lead have also been used, chiefly externally, when the disease has advanced to ulceration. GIESLER (*Beobuch*. b. v. p. 141.) recommends the acetate in the form of liniment with turpentine, and SCHÖNHEIDT (*Soc. Med. Hann. Coll.* vol. i. n. 4.), advises the continued application of lotions of this salt in a decoction of conium. It has also been used in thin sheets constantly pressed upon the scirrhous tumour. Of the various other remedies brought forwards by authors at different periods, and stated by them to have proved serviceable, I may briefly notice the following:—HORSTIUS (*Observ.* l. ix. ob. 3.) prescribed internally, and externally, sulphur, with spirit of turpentine; RULAND (*Cur. Ampir.* i. n. 92.), the balsamum sulphuris; and various other writers, the oleum sulphuris (F. 21.). The sulphurets have also been employed, both internally and externally, either alone, or with narcotics, and sometimes with benefit. GATTAHER (*Observ. on the Intern. Use of the Solanum*. Lond. 1757.) used the *solanum nigrum*; and PAULUS ÆGINÆ (l. iv. c. 25.), ONIASIUS (*Synop.* l. vii. c. 13.), and CABEL, the expressed juice of the *solanum dulcamara*, externally; the last-named author exhibiting it internally at the same time. Opium, as well as other narcotics, is often necessary in order to alleviate the patient's sufferings, and with this view has chiefly been employed. I believe, however that, when combined with suitable remedies, it is otherwise productive of benefit. The *volatile* and *fixed alkalies* have been exhibited by BARKER (*New York Med. Repos.* vol. iv. n. 4.), MARTINET and BARBETTE (*Journ. de Méd.* t. lvi. p. 559.); *antimonials*, by ROWLEY and THEDEN (*Bemerk.* b. ii. p. 86.); *barytes*, by CHAWFORD (*Duncan's Med. Comment.* vol. xiv. p. 433.); *cinchona*, by HOMBERG, VIRSUSSENS, and PLENK (*Samml. von Beob-*

bacht. i. n. 6.); the expressed juice of the *chelandium* and the sulphate of zinc, by BERCHMANN; time-water by VOGEL (*De Curat. Cancr. per Aquam Calcis Viræ potum*, &c. Goet. 1769.); the *orobanche Virginiana*, by BARTON and BENNETT (*Philad. Med. Journ.*); an ointment with the juice of the *burdiana* and acetate of lead, by PERCY (*Hufeland N. Annalen*, i. p. 381.); camphor, by several authors; the *sedum acre*, by BUCHOZ and QUESSAT; the *onopordum acanthium*, by GOELICKE (*De Onopordo Carcin.* Aver. &c. Fr. 1739.), HANDEL, JUNKER, and ROSS; myrrh, by NICOLAS (*Hufeland N. Annalen*, i. p. 362.); fixed airs, by BEDDOES, PERCIVAL (*Essays*, ii. p. 73.), INGENIOUS, and PEYRIER (*De Cancro*, p. 75.); *digitalis*, by RICHTER (*Chirurg. Bibl.* b. iv. p. 591.); the *hydro-sulphuret of ammonia*, by BURNS; *petroleum*, by RAMMAZZINI and PIERCE; the *rhododendron chrysanthemum*, by PALLAS; and *aconitum*, *sarsaparilla*, *guaiacum*, the *becabunga*, the *phellandrium aquaticum*, &c. by various writers. All these have been prescribed both internally and externally, with little or no advantage, or with very temporary benefit only.

36. *g.* Of the numerous external remedies recommended at various periods, the preparations of arsenic and quicksilver; charcoal and cariot poultices, the mineral acids, particularly the oxymuriatic and chloric acids; the chlorurets, and many of the metallic salts; camphor, the balsams, and the terebinthinate substances; ammoniacum, galbanum, and myrrh; and the greater part of the astringent, antiseptic, detergent, and stimulating vegetable medicines, have obtained a greater degree of reputation; and, when some of them are judiciously combined with one another, and with narcotics, they are deserving of notice as discutients in the early stage of the disease, and as palliatives in its ulcerating state.

37. Frictions of the part were advised by PONTFAU, and YOUNG entertained sanguine expectations of the result of pressure,—a practice which, very recently, has received the support of RECAMIER, and several French physicians. M. JOURNET states, that he has found small local blood-lettings, and the following pills, most serviceable in the different stages of cancer. (*Archives Gén.* vol. xvi. p. 282.)

No. 86. R. Saponis Medic. 3iv.; Gum. Ammoniac 3ij.; Ext. Conii et Ext. Aconiti Nap. 3jss.; Masse Pilul. Russ 5j. M. Contunde bene simul, et divide in Pilulas gr. v.

He directs two of these to be taken night and morning, increasing the dose by an additional one daily, until twelve, fifteen, or even twenty, are taken, morning and night. The rest of the treatment consists in applying poultices of the recent conium; using decostruent and solvent beverages, a mild diet and regimen, and wearing an issue or seton in the arm or thigh. This plan has likewise been advised by Dr. LOWASSY, by whom it was first practised.

38. *h.* Sir A. COOPER expresses himself very strongly against low diet in this disease,—a practice which had been much insisted on by Mr. PEARSON, Dr. LAMBE, and HUFELAND (*Journ. der Pract. Arzneik.* b. i. p. 289.) The opinion of Sir ASTLEY is certainly in accordance with accurate observation, and rational induction. This very eminent surgeon states, that he has seen most benefit derived from PLUMMER's pill given at bed-time,

and stomachic tonics in the day, consisting chiefly of the bitter infusions, with ammonia, and the sub-carbonates of the alkalies. Some advantage was also derived from a pill, consisting of half a grain of stramonium, with two grains of camphor, given twice or thrice a day.

39. Since the introduction of iodine into practice, the preparations of it have been tried in the different stages of cancer by several physicians. The results of the trials which have been made of this substance are certainly such as ought to warrant the use of it in the early stages of the disease. The cases recorded by Dr. WAGNER (*Rév. Méd. Juin, 1823.*), and by Mr. HILL, of Chester, are much in favour of it. I have been consulted in two cases occurring in females between thirty and forty, for what was considered, by the attending practitioners, *scirrhus mammae*, owing to the lancinating and remitting pains, and the diseased state of the nipple and axillary glands. They were both put upon a course of iodine (℞ 328, 329.); and conium, with the sub-carbonates of potash, was given internally; a light nutritious diet, and strict attention to the state of the uterine functions, were also observed. Perfect recovery has taken place in both: but it appears doubtful whether or not they were genuine cases of scirrhus, notwithstanding the signs now alluded to were present. They had, however, withstood other means of cure for a long time. The treatment, in one of the cases, was chiefly conducted by Mr. Faxon, according to the above suggestions.

40. (C. Cur.) Consistently with the opinion stated above (§ 26.), I conceive that the treatment of this disease should be directed to the fulfilment of the following intentions:— 1st, To support the energies of life, by exciting the digestive functions, and the abdominal secretions and excretions; 2d, to soothe the morbid sensibility of the part, and promote the absorption of morbid depositions in its tissues, by means of anodynes combined with deobstruents and discutients; and, 3d, to impart vigour to the frame by suitable medicine, diet, and regimen. The remedies which are calculated to fulfil the first indication, may be often conjoined with those intended to accomplish the second and third; and both internal and external means may be simultaneously used, with those views. The medicines already enumerated comprise nearly all that have been found of any service in this distressing malady. But the advantage to be derived from them will mainly depend upon their combination and exhibition appropriately to the circumstances of individual cases.

41. The preparations of iodine given in very small and frequently repeated doses, with potash, and conium, or opium, will be found amongst the best remedies that can be used; inasmuch as, when exhibited in this manner, they are both tonic and deobstruent. They may also be used externally in the form of ointment; but one third of the proportion of hydriodate to the ointment usually employed should be prescribed, and friction with it ought to be of much longer continuance than is commonly directed. Either stramonium, conium, opium, belladonna, hyoscyamus, or aconitum, may be given in various forms in the intervals between the exhibition of the iodine; and be combined with tonic infusions or decoctions, with the fixed or volatile alkalies, or with camphor in doses of from two to six grains. They may also be tried

in conjunction with the preparations of arsenic, or of iron, or the chlorates of potash, soda, or lime, and as external applications also, when the disease has gone on to ulceration. In females, scirrho-cancer is generally connected, at its commencement, with disorder or the cessation of the menstrual discharge. In such cases, the preparations of iron with ammonia, or the fixed alkalies, and aloe, are sometimes of service. I have observed most advantage in these cases from frequent and full doses of conium, in the form of powder, given with the sub-borate of soda.

42. Tonic infusions, or decoctions, with liquor ammoniæ aceticæ, or with the carbonates of the alkalies, and extract of conium, or the tincture of hyoscyamus; the oxymur. hydrarg. in the compound tincture of cinchona, or compound decoction of sarsaparilla; or small doses of blue pill, or hydrarg. cum creta, with camphor, and either of the narcotic extracts; the preparations of sulphur, and the sulphurets; the phosphates of iron, or this metal combined with ammonia, and conium; the sulphates of quinine and zinc; and the balsams and terebinthines; may severally be employed.

No 87. ℞ Decocti Cinchonæ ʒj.; Liq. Ammon. Acet. ʒij.; Liq. Ammon. ℥xx.; Extr. Conii gr. vj.; Tinct. Capsici Annui ℥viij. M. Fiat Haustus, ter die sumendus.

No 88. ℞ Potassæ Sulphuret ʒjss.; Pulv. Fol. Belladonnæ ʒjss.; Saponis Castil. ʒj. Gum. Ammoniac ʒj. Syrup. Simp. q. s. Simul contunde, et divide massam in Pilulas ix. quarum capiat tres ad quatuor ter quotidie.

No 89. ℞ Infus. Anthemidis ʒjss.; Liq. Potassæ ℥x.; Tinct. Hyoscyami ʒss. M. Fiat Haustus, ter die capiendus.

No 90. ℞ Hydrarg. cum Creta gr. j.; Camphoræ rasæ gr. iij.; Extr. Aroniti (vel Belladonnæ, vel Stramonii) gr. ss. ad gr. j.; Solis Sub-carbon. exsic gr. viij.; Bals. Peruvian. q. s. ut fiant Pilulæ iij. mane nocteque sumendæ.

No 91. ℞ Arsenici Albi gr. vj.—x.; Opii Puri gr. xij.—xx.; Oxydi Zinci ʒss.; Butyr. Recent. ʒj.; Cere Flavæ Liq. ʒjss.; Lique triturat, misceantur exactiss. et f. Unguentum parti affectu applic. (HARLESS, *De Arsen. Uti in Med. Norm.* 1811.)

No 92. ℞ Extr. Conii mac. Balsam. Peruv. ʒā ʒj.; Plumbi Acet. ʒj.; Tinct. Belladonnæ ℥xij.; Tinct. Opii Comp. (℞ 723) ʒj.; Unguent. Cere ʒj. M. Fiat Unguentum.

No 93. ℞ Ferri Ammoniaci ʒjss.; Extr. Conii ʒj.; Pulv. Capsici Annui ʒss.; Extr. Aroniti gr. iv. Camphoræ rasæ gr. xv.; Extr. Aloës purif. ʒj.; Syrup. Simp. q. s. M. Contunde bene simul, et divide in Pilulas xlvij. quarum capiat tres, ter, quaterve quotidie.

No 94. ℞ Herbae Beccabungæ contus. ʒij.; Pulv. Capsici Annui ʒss.; Aquæ Ferrentis O. J. Macera bene et cola. Dein adde Liq. colat. Solut. Arsenici ʒj. (vel Chlor. Calcis ʒjss.); Extr. Opii Aquos. ʒj. M. Fiat Loto, pro parte affecta.

No 95. ℞ Balsam. Canad. ʒjss.; Oxyd. Zinci ʒij.; (vel Sub-carbon. exsic ʒj.); Pulv. Folii Conii ʒj.; Pulv. Capsici ʒjss.; Pulv. Tragacanth. Comp. q. s. ut fiat Massa Pilularis, quam divide in Pilulas xlvij. Capiat tres ter die; et augeat ad quatuor quater quotidie.

43. D. Although the malady obviously has a constitutional origin, yet the propriety of *extirpating the affected part*, as soon as the true scirrhous character becomes manifest, may be conceded. After this is accomplished, the constitutional vice may be more successfully combated, and the re-appearance of the local disease more probably prevented than at a later period. When, however, the system exhibits any of the symptoms of the cancerous cachexia, whether the adjoining glands be enlarged or not, nothing will be gained by an operation; but some advantage may still accrue from judicious and energetic medical treatment, particularly from tonics combined with anodynes, alteratives, and deobstruents. Whilst medical

measures have often obtained the credit they by no means deserved, from the circumstance of local diseases mistaken for scirrhus having been removed by them; so I believe that surgical operations have sometimes acquired reputation from the same cause.

44. During the treatment of this malady, attention must be especially directed to the secretions and evacuations. The bowels ought to be kept freely open, with deobstruent laxatives, combined with tonics and vegetable bitters. The diet should be nutritious, and easy of digestion. Pork, in every state, ought to be avoided, as well as other indigestible kinds of meat. Change of air, and of scene, with agreeable amusements, serve essentially in assisting the influence of a judiciously devised method of cure, and should, therefore, not be overlooked by the practitioner; and several of the tonic and deobstruent mineral waters are of use, particularly those of Bath, Tunbridge, Buxton, Spa, &c.

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CARCINOMA. See **CANCER**.

CARDIALGIA. See **INDIGESTION**.

CARDITIS. See **HEART**, *Inflammation of*, &c.

CATALEPSY AND CATALEPTIC ECSTASY.

CLASSIF. 2. Class, Nervous Diseases; 1. Order, Comatose Affections (*Cullen*).

4. Class, Diseases of the Nervous Function; 4. Order, Affecting the Sensorial Powers (*Good*). II. CLASS, III. ORDER (*Author*, see *Preface*).

1. *Catalepsy and Ecstasy*, although treated of by some writers as distinct affections, generally present very nearly the same pathological conditions, as respects the presumed states of circulation in the brain, of vital energy, and of nervous influence; manifest similar morbid relations and complications, in their origin and progress; are so far modified in their symptoms, as frequently to pass insensibly into each other; and therefore require, according to such manifestations, a treatment in all respects the same. For these reasons I shall consider them, in this article, as varieties of the same species of disease; and, if nothing more be gained by thus connecting them, repetition will be, at least, avoided.

1. **CATALEPSY** — **TRANCE** (from *καταληψις*, the action of seizing, and that from *καταλαμβάνω*, I seize). **SYN.** *Καταληψις*, Greek. *Catalepsia*, *Catalepsi*, *Catochus*, *Prehensio*, *Congelatio*, Auct. Lat. *Carus Ecstasis*, *Carus Catalepsia*, *Good*. *Entonia Catalepsi*, *Young*. *Catalepsi*, Fr. *Die Starrnucht*, *Katalepsi*, Ger. *Catalepi*, Ital. *Trance*.

2. **DEFIN.** A sudden deprivation of sense, intelligence, and voluntary motion, the patient retaining the same position, during the paroxysm, in which he was at the moment of attack, or in which he may be placed during its continuance; the pulse and respiration being but little affected.

3. This disease is very rare; so much so, that its existence has been doubted by many writers, who consider it to have been feigned. Its occasional occurrence is, however, well ascertained. I have seen one case of it in my own practice, and been consulted by letter respecting a second. I recollect, also, an undoubted example of it in an hospital, the practice of which I attended when a student. It presents no precise or undeviating train of symptoms, but varies in many particulars; the phenomena noticed in the definition being those most uniformly present. This varying character of the disease, according to the description given of it by authors, is owing to two circumstances; — 1st, to the modified state which it actually assumes, from the circumstances connected with its origin; and, 2dly, to certain of its phenomena having been more particularly noticed by some authors than by others, who have either mentioned them incidentally, or entirely overlooked them.

4. **SYMPTOMS.** — This is an intermittent and apyrexial disease, occurring in paroxysms of variable duration; and generally after very irregular intervals. The seizure is occasionally announced by premonitory symptoms, — by headach, mutability of temper, yawning, tinnitus aurium, vertigo, palpitations, lassitude, pain or slight spasm of the limbs or neck, confusion of mind, &c.; but it is commonly sudden, — the patient retaining the same expression of the countenance, and posture of the body, as at the moment of attack. The eyes are fixed, are open or shut, the pupils usually dilated, but contractile from a strong light; and, from their unvarying expression, and the unchanged attitude, the body has the appearance of a statue. Any position, in which the head, trunk, or limbs are placed, is retained without deviation; the passive contractility of both the flexor and extensor muscles being such as to admit of a change as well as retention of the position during the paroxysm. The evacuations are either suspended during the fit, or passed involuntarily.

5. After a very indefinite duration — sometimes of only a few minutes, at others of several or even many hours, but rarely of days — the patient is restored to consciousness. In a remarkable case, however, detailed by Dr. **BURROWS**, the fit lasted many days. Restoration is usually instantaneous, accompanied with sighing, and followed by pain or confusion in the head, and a sense of fatigue and lassitude. The patient has no recollection of what has passed during the fit: and the same ideas, and, according to some, even the same sentences, which had been suspended by the seizure, have been pursued, the moment of recovery.

6. The countenance, during the paroxysm, is sometimes little changed; at other times, it is paler than usual; but it is more commonly slightly suffused, and the pulsations of the carotids more forcible than natural. The respiration is variable, sometimes it is embarrassed: the temperature of the surface is also unequal; being generally depressed in the extremities and increased in the head, evincing an irregular distribution of the circulation. The pulse is occasionally very slow: SAUVAGES found it only 50; but it is more commonly quick and small. The

re so entirely abolished, that the patient may be pinched, without feeling it; and he cannot hear the loudest noises. The state of the muscles during the attack varies somewhat in different cases. They are often slightly rigid, but not to the extent of preventing the easy change of position of the limbs; and sometimes the position so permanently retained is one, which no person in health could so long preserve. M. GEORGE states, that the muscles often present a degree of tetanic rigidity; but this is only sometimes the case, particularly when the disease is more nearly allied to *Ecstasy*. In some cases, it would seem as if a partial state of volition existed, of which the patient either had no consciousness, or a very imperfect consciousness at the time, and consequently, no recollection of the act subsequently, as in some states of sleep.

7. In the more complete seizures, sense, intelligence, voluntary motion, and consciousness, are entirely abolished; but, in some instances, the abolition is only partial; the patient being conscious, but incapable of moving or speaking. This imperfect form of the disease has very generally received the appellation of *catachus* from nosologists; and numerous instances of it are on record. A very marked case, and nearly approaching to fully formed catalepsy, is recorded in the *Edinburgh Medical Commentaries*, by Dr. FITZPATRICK; and lighter grades of it have been met with as a subordinate symptom of chronic nervous diseases, particularly of the severe and obstinate forms of hysteria. In a case, however, of well-marked *catachus*, in a female, detailed by Dr. LEBROCK, no hysterical symptoms existed; and, instead of unusual susceptibility of the system having been observed, in this and other cases which he had met with, more than common torpor was apparent. M. PETITIN and others, who believe in animal magnetism, conceive that sensation, instead of being lost for the time, is concentrated towards the epigastric region; and that the intelligence, so far from being altogether abolished, is exalted to a degree to amount almost to prophecy. But these opinions can only be applicable to ecstasy.

II. CATALEPTIC ECSTASY. *Ecstasis, Ecstasy* (from *εκστασις*, from *εκ* *στασις*). SYN. *Extase*, Fr. *Entzückung*, *Begeisterung*, Ger. *Estasi*, Ital. *Ecstatic Trance*.

8. DEFIN. Suspension of consciousness of external objects, and of voluntary motion, arising from, and attended by, a high degree of mental excitement and abstracted contemplation, the muscles continuing more or less rigidly contracted, or only partially relaxed.

9. Under the term ecstasy, Dr. GOON has described a variety of catalepsy, but little different from the usual appearance of that form of

seizure, instead of the particular modification of disease to which the name ecstasy has usually been applied. This variety of cataleptic disorder is generally induced by mental excitement and sustained contemplation of some particular subject, most generally of religious topics, and of those exciting the affections and passions. The patient suddenly seems mentally struck, or carried away from all external objects; either standing or sitting in a most excited and impassioned position, with the eyes fixed and open; and sometimes uttering either the most enthusiastic and fervid expressions, or the most earnest denunciations and warnings, or the most absurd exclamations, with the feeling or belief of their reality; and total abstraction from, or unconsciousness of, all surrounding objects or persons.

10. This affection is variously modified. In some cases it very nearly approaches to pure catalepsy; in others, to a sort of maniacal excitement. Dr. CRISHOLM records an instance of this latter state in a young female, in whom it alternated with mania; and I was consulted by a practitioner in the country, respecting a most marked case occurring in a religious young lady, where it was evidently connected with, if not consisting of, an exalted form of hysteria. During the attack, she sung and composed long doggerel strains. Many of the cases which have lately made so much noise in this metropolis, under the idea of inspiration with "unknown tongues," evidently belong to this affection; at least, such of them as have not been feigned. The effects produced by the practisers of animal magnetism, upon nervous persons, sometimes appear allied to this affection. Many of the Italian improvisatori are possessed of this faculty only whilst they are in a state of ecstatic trance, similar to this disease. And few of them enjoy good health, or consider their faculty otherwise than a morbid one.

11. THE TERMINATIONS OF CATALEPTIC AND ECSTATIC SEIZURES are generally either in health, or in disease of the cerebral functions. They may pass into mania, epilepsy, or confirmed insanity. Dr. BURROWS's case, already alluded to, was complicated with mania, following excited and ungratified passions, and interruption of the menses. Recovery, however, took place, and the patient afterwards bore children. Dr. GOON met with a case which supervened on, and was followed by, melancholia. J. FRANK treated a case of catalepsy, that terminated in mania, of which the patient at last recovered; and BERNARDI details the history of a case complicated with mania. PINEL records a case of catalepsy which terminated in apoplexy. ROSTAN states, that he has observed a case in which inflammation of the lungs was associated with it. In many instances, these affections terminate, as they commence, in most severe hysteria; with which a very large proportion of them are more or less intimately allied.

12. But little is known of their relation to morbid states of the brain or viscera. HOLLIER, however, informs us, that he found the vessels of the brain and cerebellum distended with black blood, and slight extravasation in a case which terminated fatally. LIETAUD and AB HERS make mention of fibrinous concretions formed in the longitudinal sinus, with disease of the lungs and liver. According to the state of the counte-

nance, temperature of the head, and action of the carotid arteries, during the fit, it may be inferred that active congestion, or an efflux of blood, far beyond what obtains in health, takes place to the brain, and is instrumental in the production of the disease.

13. **PROGNOSIS.**—These affections do not appear to be attended with much danger. The fully formed cataleptic seizure is, however, a serious disease. The cases already adduced in illustration of its termination are sufficient to indicate this. Fatal cases are, however, noticed by HOLLIER, DONONCEUS, and the authors just quoted. AETIUS, DE LA TOUR, FAHR, and SAVAGES, state that they have seen it disappear after copious epistaxis, and return of the menses.

14. **CAUSES OF CATALEPTIC SEIZURES.**—A. The predisposing causes are, whatever diminishes vital power, and increases the susceptibility of the nervous system, particularly the depressing passions, violent and continued sorrow, great anxiety, unrequited affection, intense and sustained mental applications, religious contemplations, exhaustion from repeated miscarriages or severe confinements, and excessive venereal indulgences and masturbation. The hysterical, hypochondriacal, and melancholic temperaments, are evidently most disposed to these attacks. They occur at all ages, from six or seven years till old age; but they are very rare before puberty; and are much more frequent in females than in males.

15. B. These affections are most commonly excited by some violent mental impression; by certain of the above pre-disposing causes, when acting intensely, particularly religious enthusiasm; great mental application, and the passion of love; frights, terror, or uncommon dread; the irritation of worms in the prima via; suppression of the menses, of eruptions and accustomed discharges; injuries of the head (STRARK); concealed mental emotions; and ungratified passions; and disturbance of the uterine functions. RENARD (*Hufeland's Journ. die Pr. Heilk.* June, 1815.) relates a case which was occasioned by disease of the ovary. SPRENGEL states, that these seizures are induced by onanism. J. FRANK remarks, “nunquam catalepsin in Judæis observavi, ac onanie vitium rarius inter eos, quam alias apud gentes inveni.” (*Prax. Med. Univ. Præcip.* v. ii. p. 487.) I believe that many cases in females are chiefly exalted or more severe states of hysterical affection; and more or less connected with disorder of the nerves and circulation in the uterus and ovary.

16. **DIAGNOSIS AND PROGNOSIS.**—The practitioner must not overlook the fact of all those affections being frequently feigned, particularly by females, even by those in good circumstances, and when there can be no end to serve by the imposture further than to create interest in their behalf. Although cataleptic and ecstatic seizures pass insensibly into each other, and are in their nature obviously very intimately related, yet their more extreme and distinct forms are very different. In the former affection, the patient resembles a statue, is entirely deprived of voluntary motion, and is perfectly mute: in the latter, the countenance is animated and earnest; the muscles are more or less rigid; the patient talks, exclaims, or even sings with the utmost ardour; and the character of the whole frame is that of the most abstracted and intense contemplative excitement;

consciousness of all other objects and ideas, excepting of the particular subject by which the mind is excited, being abolished: but the consciousness is often of a morbid or imaginative kind; the patient conceiving, as in the instances adduced by TISSOT, that he has seen wonderful visions, and heard singular revelations. Ecstasy may be confounded with *somnambulism* and *reverie*. The excited, and, as it were, inspired appearance of the patient, in the former affection, is sufficient to distinguish it from the more passive character of the latter, in both of which he resembles a person half asleep, or sleep-walking. The statue-like appearance and muteness of the *cataleptic* are alone sufficient to distinguish this disease from these latter affections. (See § 4—6.)

17. Catalepsy may also be mistaken for asphyxia, syncope, apoplexy, and even for death itself. The total suspension, however, of respiration and circulation, the deep colour of the lips and countenance, in *asphyxia*; the flexibility of the limbs, great paleness of the face, and the scarcely perceptible performance of the respiratory and circulating functions, in *syncope*; and the congestion of the head and face, the stertorous breathing, relaxed and flexible limbs, and the attendant paralysis, in *apoplexy*; are sufficient of themselves to distinguish it from any of the modifications of the affection now under consideration. It is possible, also, that a cataleptic patient may be considered as being dead. There are many instances on record, where persons in a state of trance have narrowly escaped being buried alive; and there is every reason to suppose that, in countries where burial usually takes place much sooner after dissolution than in this, such a circumstance has actually occurred. But this could never have occurred, unless the respiration and pulse had been suppressed, and the countenance pale. The stethoscope may now possibly prevent such an occurrence from taking place, by detecting the feeble action of the heart, which can never be altogether extinct in catalepsy. The states of the sphincters, and of the cornea, and the temperature of the trunk of the body, will further serve to prevent so distressing a mistake from ever occurring, even independently of due reservation of the body from inhumation, till indubitable proofs of death show themselves. As to discovery of feigned seizures of these affections, the general characters of the case, and the practitioner's own acumen, must be the chief guides.

18. **TREATMENT.**—When we consider that evidence of determination, or of active congestion, of blood in the head, has generally been furnished in these affections, the propriety of *vascular depletion* will not be disputed. If the signs of general or local plethora be very manifest, and if the disease have any relation to suppression of the menses, cupping between the shoulders, the application of a number of leeches to the nape of the neck and behind the ears, stimulating pediluvia, and bleeding from the feet, should be employed. If the temperature of the head, and the action of the carotids be increased, the affusion of cold water on the head, or the use of cold or evaporating lotions in this quarter, whilst the lower extremities are plunged in warm water, will be of service. In addition to these, *purgatives* should be given by the mouth, and repeated; a constant, but moderate action, being thereby exerted upon

the bowels; and antispasmodic or turpentine enemata should be administered from time to time. (Sec F. 130. 135. 150. 152.). The aloetic purgatives (F. 450—455. 470. 518.), are particularly eligible, when the affection is connected with irregularity of the menstrual evacuation. DREIER advises active hydragogue cathartics.

19. The above means are equally applicable to the paroxysm, and the interval, or suppression of accustomed evacuations, in cases characterised by plethora, or local determination of blood. If resorted to in the fit, they may be conjoined with various antispasmodics, as valerian, musk, ether, assafoetida, camphor, ammonia, &c., and volatile stimuli may be occasionally held to the nostrils, when the face is pale, and signs of determination of blood to the head are wanting.

20. The utmost attention should be directed, during the intervals, to the state of the uterine organs. If signs of congestion or of irritation are detected in this quarter, cupping on the loins, the application of leeches to the groins and tops of the thighs, and the internal use of the boracic acid, or of the sub-borate of soda, combined with refrigerants and anodynes, should be resorted to. The frequent association of these complaints with hysteria indicates the propriety of having recourse to a nearly similar treatment to that recommended in it, and to the same appropriation of medicinal means. BEUDENS attaches considerable importance to the state of the stomach and prima via in cataleptic seizures. There can be no doubt of the functions of these organs being often impeded or disordered, and of the propriety of restoring them to a healthy state. This can be done only by a judicious combination of tonic and aperient, or of deobstruent medicines.

21. When these affections have arisen, as they not infrequently do, from depressing or exhausting causes, the judicious combination of tonics with gentle aperients and antispasmodics, will be of much service. The shower-bath, salt water bathing, change of air, tonic and deobstruent mineral waters, regular exercise, early rising, and mental amusement, will be most advantageous in such cases. Several of the causes of the disease are both of an exhausting nature, as respects the constitutional energies, and of an exciting kind, in regard of the cerebral organs, particularly some of those which induce the ecstatic form of seizure (§ 8—10.). In these, it will be necessary to diminish the local determination to the brain, which is generally present, by the means indicated above (§ 18.), whilst we soothe the nervous system, and restore the digestive functions and the energies of the frame. To accomplish these ends, we must resort to a combination or alternation of tonics with anodynes, antispasmodics, and aperients (F. 453. 572.), keeping at the same time the head cool, the secretions and evacuations free, the mind amused and disengaged, the feet warm, and the blood as regularly distributed throughout the body as possible.

22. When the disease is complicated with mania, melancholia, or epilepsy, similar means to those already stated may be employed, appropriately to the state of vascular excitement and vital powers, and to the symptoms more immediately connected with the brain and the uterine organs. In several cases of these complications, full and frequent doses of calomel will be of ser-

vice, and, under careful supervision, it may be judicious to exhibit, in conjunction with anodyne, nervine, or antispasmodic remedies, the milder preparations of mercury, until the mouth is slightly affected. In all cases where the above means fail of producing the expected effect, and particularly in these complications, issues, or setons, perpetual blisters, or the tartarised antimonial ointment, or moxas, should be directed to the nape of the neck, the occiput, or behind the ears, and perseveringly continued. In most instances, whether simple or complicated, after the affection of the mouth by mercurials, or the long continued use of setons, &c., the more tonic and restorative means advised above should be prescribed. Amongst the various antispasmodic medicines recommended by authors on these affections, I may notice the different antispasmodic gums, by STARK (*Klin. Instit.* p. 172.); the ammoniated copper, by THEUSINK (*Samml. Auserl. Abh. für. Pract. Aerzte*, &c. xvii. p. 279.); electricity, by LEDRA and SIGAUD LA FOND (*De l'Elect. Méd.* p. 396.); the cautery to the occiput, by BLANKARD (*Collect. Med. Phys.* cent. v. No. 18.); and cinchona combined with valerian. The different preparations of iron, and various antispasmodics, have been recommended by Dr. LUNBCK, and exhibited by him in a case where, however, they appeared of little service, most advantage having been derived from travelling, pure air, and agreeable mental occupations. (*Edinb. Med. and Surg. Journ.* vol. i. p. 61.). During the whole course of treatment, the strictest reference ought to be had to the nature of the predisposing and exciting causes, the habits and practices of the patient, and to his diet, and physical and moral regimen.

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CATARRH. — SIMPLE CATARRH. SYN. Catarrhus (from καταρρῆς, defuso). Gravello, Coryza, Bronchus, Catarrheuma, Fluxio, Rheuma, Capiplenium, Auct. Var. Catarrhus simplex, Richter. Phlegmhymentitis (from

φλεγμα, mucus, and μεν, a membrane), Hildenbrand. *Catarrhe, Rhume, Fluxion*, Fr. *Ein Fluss, Schnupfen, Katarrh*, Ger. *Catarro, Reuma*, Ital. *A Defluxion, a Cold*

CLASSIF. 1. *Class, Fevers; Order, Fluxes (Cullen)*. 3. *Class, Sanguineous Function; 2. Order, Inflammations (Good)*. 11. *Class, 1. ORDER (Author, see Preface)*.

1. DEFIN. *Sneezing, watery discharge from the nostrils; lachrymose state of the eyes; slight gravative headach, chillness, evening fever, sometimes accompanied with sore throat, hoarseness, and cough.*

PATH. DEFIN. *Specific irritation of the mucous surface of the nostrils, extending to the frontal sinuses and eyes, in one direction; to the posterior nares, fauces, and throat, in another; and occasionally also to the pharynx, œsophagus, glottis, and trachea, thus terminating in catarrhal bronchitis.*

2. Although the most common of all diseases, there are few which are less understood, or have called forth a greater diversity of opinion, than catarrh. This uncertainty is chiefly owing to its varying characters, arising from the limitation or extension of its seat, the temperament and habit of body of the patient, the causes which occasion it, and the severity of the attack. If the affection be not extended much beyond the Schneiderian membrane, it very generally receives the name of *coryza*, or catarrhal *coryza*; if it be seated in the frontal sinuses it is called *gravedo*, or catarrhal cephalalgia; if in both these situations, a cold in the head; if the fauces be its principal seat, catarrhal cynanche, or catarrhal sore throat; if the glottis and pharynx, catarrhal cough and hoarseness; if it advance to the trachea and bronchi, catarrhal bronchitis; and if the eyes be primarily affected, catarrhal ophthalmia. It may thus be limited to any one of those situations, or be extended to two, or more, or even all of them, according to the predisposition of the parts and of the person affected. It may even proceed further, as to the air-passages on the one hand, or to the œsophagus and digestive organs on the other, after having subsided in, or disappeared from, its primary seat; and it may even be coexistent in several, or even all of these situations.

3. If we consider the origin and phenomena of catarrhal affections, we shall observe many characters warranting an analogy between them and rheumatism on the one side, and erysipelas on the other. Catarrh is a disorder proper to mucous membranes, and is not limited to the parts of this tissue above specified. The same causes which occasion it in them, will sometimes, although much less frequently, excite it in other parts of this system, according to morbid predisposition of the organs. Rheumatism is an affection of the fibrous, sero-fibrous, and aponeurotic structures, and generally proceeds from the same or very similar causes to those which produce catarrh; they are both also often present at the same time, and in the same person, and the epidemic prevalence of both is not uncommon. Erysipelas is an affection of the skin, also often depending upon similar causes to those which produce catarrh and rheumatism, particularly those connected with the states of the atmosphere; and all of them are benefited more or less by a

nearly similar treatment. Neither of these diseases is the same as true inflammation, although presenting more or less of the inflammatory characters, but also some which are proper to each. On this account, therefore, should they be viewed, even when approaching the nearest to inflammation, as essentially specific diseases; possessing, however, certain symptoms in common with one another, and with inflammation; the same causes acting on a certain number of individuals, producing catarrh in many, rheumatism in some, erysipelas in a few, and true inflammation in others, according to the diathesis, habit of body, state of the abdominal functions, previous disorder, &c. of the affected.

4. I. CAUSES. — A. *The predisposing causes of catarrh are referrible chiefly to original conformation and diathesis, and to previous disorder, particularly as respects the state of the digestive and assimilating organs.* It most frequently affects persons of a phlegmatic temperament, relaxed habit of body, and delicate constitution, or who are weakened by any cause, particularly by morbidly increased secretions and discharges; also those with long necks and narrow chests, or who indulge in warm apartments and beds, who rise late, and take little exercise in the open air. It is very common among the inhabitants of cold, moist, and changeable climates, more particularly during spring and autumn, and in variable or wet seasons; and in persons whose digestive organs are deranged, the functions of the liver torpid, and whose biliary organs and alimentary canal are loaded by morbid or accumulated secretions.

5. B. *The exciting causes of catarrh are most commonly cold and moisture, or other states of the air, which either are or are not perceptible to the senses, but which impede or check the insensible cutaneous perspiration, and change the functions of those parts of the mucous surfaces most obnoxious to their first impression.* That there is something in the air, often producing catarrh, beyond what is perceived by our senses, is shown by the very general or even epidemic prevalence of the affection during states of the weather and of the air, in which nothing peculiar can be observed. Its great frequency, particularly in certain localities and seasons, has induced some authors, amongst whom Dr. MACCULLOCH is pre-eminent, to impute it to a diluted or generally diffused malaria proceeding from the usual sources of this active agent of disease.

6. Change of locality, whilst it will often remove a cold, will also frequently occasion it, especially in some constitutions; and a current of air, particularly if it come directly on the face, is a very common cause. The occurrence of catarrh on travelling and visiting places at a distance has been attributed to malaria; and this may very possibly be the case in many instances. Whenever I have gone any distance into Essex, I have returned with catarrh. It is very commonly believed by unprofessional persons, that the disease is infectious; from the circumstance of its commencing in one member of a family, and attacking others successively. This spread of the ailment, however, may be in a great measure owing to the diffusion of the same cause in the atmosphere, whether it be a much diluted or weak local malaria, or a more widely

spreading epidemic influence. Still I believe that there are some grounds for the popular belief. Although these causes will explain much of what is imputed to infection; still, it may, either of itself occasion the disease, or, when superadded to them, induce an attack in those whom the states of the air, without such aid, might have spared. When catarrh is occasioned by local or generally diffused influences, it may not only thereby assume an infectious character, but really possess it; thus countenancing the opinion of Dr. Cullen, that the epidemic prevalence of the disease only is infectious; yet, still, I question if this limitation be just. There can be no doubt, however, that when it arises from epidemic, malarial, or infectious sources, it is usually febrile and severe, and very prone to extend along the air-passages on the one hand, and to the digestive mucous surface on the other, particularly the former; while catarrh, arising from the more common causes of cold and moisture merely, in any one of the many ways in which these causes are applied to, and affect either the whole or parts only of the frame, is more commonly seated in the cephalic mucous surfaces, assuming the form of cold in the head, coryza, or sore throat, and quickly subsiding. It should not be overlooked, also, that sudden change from a low to a high temperature, or from a very dry to a very moist air; and even the being more than commonly overheated, without any very apparent chill, or exposure to cold in any form subsequently; will often produce catarrh. This is especially the case, if the exposure to warmth be sudden, after an impression of cold of some continuance, as the coming into an overheated apartment out of a cold and moist atmosphere,—the instantaneous transition from a raw air of about 32° to a dry air of upwards of 70°.

7. II. SYMPTOMS.—Owing to the circumstances already alluded to (§ 2.), catarrh manifests itself in various forms; but most commonly in the following manner:—*A. Its slighter states.* At a period generally varying from a day or two, to six or seven, but occasionally after even a shorter or longer time, from exposure to the cause, this affection commences with a sense of chilliness or coldness, lassitude, and heaviness of the head, followed by dryness, fulness or stuffing of the nasal passages, frequent sneezing, a dull pain and sense of weight in the forehead, and stiffness, or rather uneasiness, in the eyes. To these is more or less quickly added a distillation of a watery fluid from the nose and eyes, with slight redness and tumefaction of the mucous surfaces of these parts. Occasionally the above symptoms appear nearly simultaneously. The defluxion is generally somewhat acrid and saline, producing slight excoriation of the parts over which it passes. These phenomena constitute the *gravedo* of Celsus, and the *coryza* or *defluxion* of various authors. They may be the only ailment, and not proceed further, or they may have others rapidly superadded to them, depending upon greater constitutional disturbance, and the extension of the affection to a larger surface. In the former case, the general lassitude and chilliness ushering in the complaint are often so slight as to be overlooked; but, in the latter case, and in the severer states of the disease about to be noticed, they are

commonly more marked from the commencement and amount even to slight shiverings, followed by white tongue, acceleration of pulse, and increase of heat in the evening. The posterior nares and fauces, as well as the nose and eyes, are affected; and the patient complains of a sense of roughness, or soreness of the throat; loss of the sense of smell; sometimes of dulness of hearing, with soreness or pain extending along the Eustachian tube to the ear, with slight redness of the fauces and mouth, hoarseness, frequent tickling cough and efforts to excrete a mucous fluid abundantly secreted from the posterior nares, fauces, pharynx, and trachea; and sometimes with a loss or suppression of voice, from slight cedematous fulness about the glottis. To the foregoing are very commonly added, pains resembling those of rheumatism in various parts of the body, particularly about the neck, head, and limbs, loss of appetite, costive bowels, and slight thirst.

8. *B. Its severe forms.*—The above symptoms constitute the usual form of simple catarrh, which frequently subsides in from three, to seven or eight days; the fluid secreted becoming gradually less copious, more opaque and coloured, and, at last, thick, small in quantity, and yellowish white, or yellowish green; all disorder quickly disappearing. But in very many other instances, as the coryza and watering of the eyes subside, straitness, oppression, and uneasiness in the chest, supervene; with fits of coughing, and all the symptoms described under the *catarrhal* form of Bronchitis. In other cases, the symptoms indicate, from the beginning, a more severe affection, and a more evident constitutional disturbance, approaching more nearly to a state of inflammatory irritation of the mucous membrane of the cephalic passages, than the preceding form. In this case, the coryza and watering of the eyes are attended by much soreness and heat of the eyes, nostrils, fauces, and throat; by frequent sneezing; and by the secretion of a very copious, watery, and colourless fluid, excoriating the parts over which it passes. The fauces are red; the tonsils somewhat inflamed and enlarged; and there is a short, dry, tickling cough. The fever, which, in the slighter state of disease, was scarcely noticed, is much more evident in this, particularly towards evening; and is ushered in by chills, or shiverings, the chills often continuing throughout, and pre-coding the evening febrile exacerbations; catarrhal fever usually thus assuming a remittent type. The pains felt in different parts of the body, and the general lassitude, cough, anorexia, sluggishness of the bowels, and thirst, are also greater in this, than in the preceding state of the affection.

9. Throughout the disorder, the patient is unusually susceptible of the impression of cold, even although the skin be warmer than natural. He also inordinately disposed to experience an accession of, or to contract a fresh cold, upon the slightest exposure to its causes, or even to the least depression of temperature. Owing to this circumstance, catarrhs are often very much prolonged, and either assume a chronic form, or induce chronic bronchitis, and other serious affections of the air-passages and lungs.

10. *C. Progress and terminations.*—This form of catarrh either disappears, as in the slighter states of the disorder, with a diminished and

thickened secretion, less frequent and less severe fits of coughing, and subsidence of fever, in from four, to seven or nine days; or it affects, in a much shorter period,—sometimes almost from its commencement,—the pharynx, trachea, and large bronchi, producing slight or severe bronchitis; or it terminates in this disease, or in pneumonia, or even in pleuritis. But most commonly, under proper management, it is attended merely by a moderate catarrhal affection of the trachea and bronchi; with fits of coughing, increased mucous expectoration, &c., constituting catarrhal bronchitis. It also sometimes extends down the œsophagus, and affects slightly the stomach, inducing numerous dyspeptic symptoms; and, in persons with an irritable state of the digestive tube, occasionally passing off at last with mucous or serous diarrhoea.

11. III. PROGNOSIS.—In general, catarrh is a very slight ailment, and attended with no danger as respects itself. But, in aged persons, in those disposed to pectoral diseases, particularly those who may have tubercles already formed in the lungs, who have had hæmoptysis, or who are asthmatic, or have experienced attacks of bronchitis, pneumonia, or pleuritis, catarrhal affections require strict attention, as they very often quickly produce, or terminate in, these maladies. In many persons, also, they are very prone to become chronic, either in the form of a chronic *coryza*, with continued irritation, and slight redness of the posterior nares and fauces, and an abundant muco-puriform discharge; or in some one of the states of chronic bronchitis. In the aged, and in those of a phlegmatic temperament, or lax habit of body, catarrh often passes into a chronic bronchial flux, when it has been neglected, or renewed by incautious exposures during the treatment. Children of a lymphatic and flaccid habit of body are very liable to catarrh in the form of *coryza*; and in them it very frequently assumes a chronic form; the thick muco-purulent secretion filling up the nares, and, in infants, preventing them from taking the breast, and rendering them irritable, each attempt at sucking disordering the pulmonary and cerebral circulation in such a manner as even to occasion convulsions. In children also, the *coryza*, when allowed to become chronic, sometimes degenerates into *osena*, with ulceration.

12. IV. COMPLICATIONS.—Catarrh very commonly ushers in the febrile exanthemata, particularly measles; and even accompanies them through their course, especially in the form of bronchitis. It is also very liable to appear during convalescence from them. Its connection with rheumatism has already been noticed (§ 3.); both disorders evidently springing from the same causes. Continued fevers, as well as some epidemic visitations of fever, are not infrequently complicated with catarrhal affections. The association of catarrh with biliary and gastric derangements is very common, sometimes in consequence of the disposition to be affected by its causes during biliary disturbance, and occasionally owing to the circumstance of simultaneous disorder of the digestive, cephalic, and respiratory mucous surfaces, having arisen from the impression of the same exciting causes. These complications have especially characterised the various occurrences

of epidemic catarrh, which have been observed. (See art. INFLUENZA.)

13. V. THE NATURE OF CATARRH is deserving of some notice. Many pathologists, particularly those of the modern Parisian school,—the followers of LAENNEC and BROUSSAIS,—consider it as ordinary inflammation of the cephalic mucous membranes, or parts of this tissue which it usually affects. Other pathologists, more especially RICHTER and HILDENBRAND, view it, with stricter propriety, as an inflammation of a specific kind. I believe, although it very often terminates in true inflammation when it extends to the bronchial tubes, that it chiefly consists of a specific irritation of that portion of the mucous surface primarily affected by it, nearly allied to inflammation, and soon followed by, or accompanied with, great increase of the secreting functions of the part; or, in other words, that it is not pure inflammation, but an irritation of a specific or peculiar kind, attended by slightly increased vascularity, afflux of the circulating fluids, and augmented secretion. Since the time that VAN HELMONT ridiculed, in his *Catarrhi Deliramenta*, the opinions then entertained respecting catarrh, enquiries into its nature have been more rational, although, up to the present time, ideas have still continued very vague as to the extent of surface affected by it, many even of modern writers comprising under catarrh, not only bronchitis, but even all affection of mucous surfaces, attended with a copious serous or sero-mucous discharge.

14. One of the most interesting questions connected with this subject, and one which has been agitated by J. P. FRANK and others, is, whether the defluxion is a consequence of the suppression of the cutaneous perspiration, arising out of the irritation which the secretion retained in the circulation produces upon the cephalic and pulmonic mucous surfaces; or of the specific irritation and morbid impression of those parts by the exciting causes of the disease. The former opinion was very generally received by the followers of the humoral pathology; and the latter by HOFFMANN, and subsequently by CULLEN, PINEL, and other disciples of his school. PINEL considered the febrile phenomena merely as symptomatic of the inflamed mucous membrane, disarding the plausible opinion advanced by BOERHAAVE, that whatever of inflammation exists is caused by the acrimony of the catarrhal discharge, and that the local ailment is consecutive of the constitutional disturbance—a doctrine which is in strict accordance with the description of the disease given by RICHTER, and with the more usual succession of its phenomena. In some cases, however, it is very difficult to determine the priority of the general disturbance, the local ailment being equally early. Upon the whole, I believe it is not proved that the constitutional affection is the consequence of the local, although the former is generally increased in proportion to the severity of the latter; nor does it appear that the defluxion is caused by the suppression of the cutaneous perspiration, even granting that suppression is actually produced,—a position by no means established. I would thence infer that the causes of catarrh affect primarily the organic nerves supplying the surface principally disordered, and, through them, the system generally; and that,

owing to this change, the secreting functions and circulating actions of the part primarily or specifically impressed, are altered, and the disease fully developed; its chief modifications arising out of the degree to which the constitutional actions are disturbed, of the extent of surface affected, and of the grade of irritation produced in the capillaries of the part.

15. VI. TREATMENT.—The treatment varies much according to the symptoms and periods of the disease. Immediately upon the approach of catarrh, before febrile exacerbation has appeared, and whilst ailment is limited to the cephalic mucous surfaces, very opposite means to those required when fever is present, or when the affection has extended to the trachea, and threatens to produce bronchitis, are generally most serviceable. (Under the former circumstances, a judicious exhibition of stimulants of any kind, but especially stimulating diaphoretics, will either cut short the disorder, or render it much shorter and more mild; whilst, in the latter state, particularly when any pectoral symptoms have appeared, considerable risk will be incurred in some constitutions, although either little or none in others, of inducing inflammatory action by the same measures.)

16. Early in the disease, therefore, and while a copious defluxion has not come on, the patient may inhale through the nostrils the vapour of warm water, or of any emollient and anodyne decoction or infusion: if the ailment is no more than a coryza, or cold in the head, febrile action not having appeared, he may take, upon going to bed, an active stimulating draught, consisting, chiefly of ammonia, camphor, spirit. æther. nitrici, &c., with or without a narcotic. Either of the following will be used with advantage as long as febrile action, or any acute affection of the bronchi, has not appeared:—

No. 96. R. Spirit. Æther. Nit. ʒj.—ʒiij; Tinct. Camphoræ Comp. ʒj.—ʒij; Mucilag. Acaciæ ʒij; Spirit. Anisi ʒij—ʒij; Lq. Ammon. Acet. ʒij; Mist. Camphoræ ʒj; Syrup. Tolutan. ʒj. M. Fiat Haustus, hora somni sumendus.

No. 97. R. Camphoræ rasæ, gr. iij.—vj; Ammon. Subcarb. gr. vj.—x; Pulv. Ipecac. gr. j.; Extr. Hyoscyami gr. ʒj; Conserv. Ros. q. s. ut fiat Bolus, h. s. s.

17. The above draught will often arrest the disease, when given sufficiently early. In some cases I have directed the bolus to be taken with it, either the hyoscyamus or the tinct. camph. co. being omitted. On the following morning, a stomachic aperient may be taken; but nothing more is necessary, not even diluents, as, at this period, they will have little further effect than to increase the defluxion. When the pulse becomes accelerated, and somewhat fuller or harder than natural, with other signs of febrile action; or when the throat is more or less affected, and particularly if there be irritation about the glottis and trachea; a different practice is required. Diluents will now be of service, particularly in conjunction with emollient, diaphoretics, &c. Any of the medicines of this description in the Appendix (F. 238, 244.), or those denominated pectoral (F. 389, 426.), will be of service; or the following may be used. RICHTER states, that the first of these has generally been employed by him early in catarrh.

No. 98. R. Calomel gr. j.; Extr. Hyoscyami gr. ij.; Gum Acaciæ Pulv., Sacchari Albi, aa gr. xv. Misce et fiat Pulvis. Dispens. tales quatuor. Sumat ægrotans tertius quaque hora unum.

No. 99. R. Mucilag. Acaciæ ʒj.; Mist. Camphoræ et Mist. Amygdal. Dulc. aa ʒss.; Lquor. Ammon. Acet.

ʒij; Tinct. Camphoræ Co., Spir. Æther. Nit., aa ʒss.; Syrup. Tolutan. ʒss. M. Fiat Haustus, quartâ vel quintâ quaque horâ capiendus.

18. Whenever we deem it requisite to act moderately on the bowels, either in the course or at the decline of the complaint, a full dose of the flour of sulphur, either with, or without cream of tartar, will be found to act most beneficially, both on the catarrh and on the abdominal functions. When febrile action becomes more fully developed, or if the disease assumes an inflammatory character, with headach, flushed countenance, or hard cough, a suitable quantity, either of the liquor antimoni. tartariz., or, of the vinum ipecacuanhæ, may be added to the above draught; and either of the following given at bed-time:—

No. 100. R. Pulv. Ipecacuanhæ gr. ij.; Hydrarg. Submur. gr. ij.; Pulv. Opii Puri gr. j.; Mucilag. Acaciæ q. s. ut fiat Pulvis ij.

No. 101. R. Pulv. Jacobi Veri gr. iij.—v; Hydrarg. Submur. gr. ij.; Opii Puri gr. j. (vel Extr. Hyoscyami gr. v.); Syrup. q. s. M. Fiat Pulvis ij.

19. When ailment begins to subside, or when it seems likely to degenerate into a chronic state, with more or less affection of the bronchi, the treatment recommended in *Catarrhal bronchitis*, or in the slighter chronic states of the disease, should be prescribed. (See BRONCHITIS, § 69.) HUFELAND recommends a decoction of the untoasted coffee-berries, or the *carduus benedictus*, in those cases. JOHNSON advises the oleum camphoratum (F. 449.) on sugar; LEVINE, the oleum terebinthinæ rubbed on the loins; and KORRER, camphor, with sal ammoniac. The decoction of Iceland moss, with ipecacuanha, or spiritus æther. nit. and syrup of poppies, may also be used, or either of the following:—

No. 102. Zinc Oxidi gr. j. (vel Sulphatis gr. ss.); Pulv. Ipecacuan. gr. ss.; Extract Hyoscyami (vel Com.) gr. ij.; Extr. Glycyrrh. gr. ij. Fiat Pulvis ij. ter quaterve in die sumendus.

No. 103. R. Extr. Papaveris Albi gr. iij.; Mucilag. Acaciæ ʒj.; Tinct. Camphoræ Comp. ʒss.; Spirit. Anisi ʒj.; Decocti Althææ et Aq. Sambuci aa ʒss.; Spirit. Æther. Nit. ʒj; Syrup. Tolutan. ʒj. M. Fiat Haustus, ter quaterve quotidie capiendus.

20. When catarrh is connected with *biliary disorder*, or with accumulated sordes in the prima via, an ipecacuanha or antimonial emetic at the commencement of the treatment will often be of much service; especially when followed by a dose of calomel and an aperient draught, or stomachic purgative, in order to evacuate whatever morbid secretions or fecal matters may have been collected. If it be complicated with *rheumatism*, calomel, combined with antimony and opium, and subsequently with camphor, ipecacuanha, and opium, will be found of service; biliary collections, &c. being carried off by the exhibition, every day or alternate days, of a stomachic purgative. If catarrh be accompanied with symptoms of debility, or with those of a nervous character, forming what some German pathologists have termed *nervous catarrh*, the liquor ammoniæ acetatis, with larger doses of camphor than under the preceding circumstances, or with the spirit. ammon. arom. or succinati, or the spirit. ætheris sulphur. comp., and any of the anodynes in common use, are appropriate medicines. When the disease becomes chronic, change of air is most beneficial. During the treatment, the patient should avoid exposures to atmospheric vicissitudes, and partake only of light bland diet, observing the injunctions laid down for the management of convalescence from *bronchitis*. (See BRONCHITIS and INFLUENZA.)

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CELLULAR TISSUE. SYN. *Tela cellulosa*, *Corpus cribrosum*, *Tela mucosa*, Auct. Var. *Tissu Cellulaire*, Fr. *Tissu Muqueux*, Bordeu. *Corps Cribleux*, Fouquet. *Reticular Membrane*, W. Hunter. *Filamentous Tissue*. *Cellulo-filamentous Substance*. ITS DISEASES.

ALTERATIONS OF THE. CLASSIF. SPECIAL PATHOLOGY.—*Morbid Structures*.

1. A. The quantity of the cellular tissue varies greatly in different constitutions, a large proportion of the soft solids consisting of this structure, particularly in persons of a lax fibre and rounded fleshy form. It is relatively more abundant in the female than in the male; in the young than in the aged; in the sanguine, phlegmatic, or lymphatic temperaments, than in the melancholic; and in those who are fair, than in the dark complexed and swarthy. It may be diminished, in parts, from pressure; or throughout the body, from disease, or inanition. Long continued and laborious exertions will also apparently lessen it; or at least diminish its bulk, by causing the absorption of the serous and fatty matters deposited in its areolæ or interstices. It is remarkably increased by full and rich living, and by indolence; but its bulk is then evidently, in a great measure, owing to the general fulness of its minute vessels, and to the greater proportion of fluid contained in its interstices. Partial increase of this tissue is also observed, but chiefly in consequence of disease. It forms, in such cases, the basis of various morbid growths, particularly encysted, scrofulous, sarcomatous, and scirrhous tumours.

2. B. The consistence of the cellular tissue also varies greatly. In some persons it is unusually lax and extensible; in others, it is uncommonly dense and tenacious. The slighter changes of consistence are the result of original conformation, and of age. It is usually more lax in females than males, in the phlegmatic and lymphatic temperaments, than in the melancholic and bilious; and in very young persons, than in those of mature or advanced age. The state of vital energy also influences its consistence; for as the powers of life are reduced by disease, &c. its cohesion is proportionately lessened, and it becomes more lax and inelastic. Changes of consistence occurring in parts are chiefly the consequences of inflammatory action. Continued pressure has the effect of condensing it, and changing it from a nearly semifluid state, into a fibrous, lamellated, and firm structure.

3. C. Inflammation of this tissue gives rise to the most varied and important changes, according to

the vital energies of the frame, the state of constitution, and habit of body, the nature of the exciting causes, and the intensity of the disease. In a previously healthy state of the system, and when the exciting cause is not of a septic or poisonous nature, the inflammation is usually of the phlogistic or phlegmonous character, and its extension is limited by the formation of coagulable lymph around the centre of the part inflamed; and which, becoming condensed with the cellular tissue exterior to it, forms a cyst for the enclosure of the purulent matter which is usually formed within the part, when the inflammation has proceeded to a certain height. (See Abscess, § 5.)

4. When the inflammation arises from septic or poisonous animal secretions, or from the more common causes of irritation, or of local injury acting on an unhealthy habit of body, or during unwholesome or epidemic states of the air, it assumes a spreading or diffusive character. The disease, however, may be spreading, without being primarily diffusive; for it sometimes commences in a point or circumscribed spot, as in phlegmonous inflammation; and from the influence of certain causes, hereafter to be noticed, coagulable lymph is not formed so as to limit its extent, as in that form of the disease, and it consequently spreads more or less rapidly; the part soon losing its vitality, and the secretion from the affected vessels infiltrating and contaminating the portions adjoining it, until extensive destruction and sphacelation of this tissue takes place. The inflammation may, on the other hand, owing to nearly the same causes, attack, almost coæteaneously, a considerable extent of structure, and terminate either in the same way, or in a manner nearly resembling it. Spreading inflammation of the cellular tissue is generally the consequence of external exciting causes, particularly punctures, abrasions, wounds, fractures, &c. acting upon a predisposed system, and more commonly gives rise to a foul serous or sanious secretion, and terminates in sphacelation or gangrene; whilst diffusive inflammation is more usually produced by internal causes, or such as affect the nervous or constitutional powers previously to the development of the disease in the cellular tissue; the secretion which is formed in the part approaching more nearly than that of the foregoing to a puriform matter, and extending in various directions in the course of this structure, under the integuments, &c. which it but little affects. The former is often connected with hospital gangrene, or is nearly allied to it, as well as to various forms of foul spreading ulceration; the latter is frequently an attendant upon erysipelas, without, however, constituting any of the states of that disease; and upon the inoculation of animal poisons, as in the dissection of bodies recently dead of diseases in which the blood and soft solids are more or less vitiated. (See CELLULAR TISSUE—Diffusive Inflammation of.)

5. Cellular tissue is also often the seat of chronic inflammation, generally in circumscribed parts, giving rise to cold or chronic abscess (see Abscess, § 19.); or to certain manifestations of scrofulous disease. In this state of inflammatory action, gelatinous or albuminous fluids are commonly effused into the interstices of a greater or less extent of this tissue; imparting to it a swollen or hardened appearance; as in rheumatism, gout, imperfectly cured erysipelas, pelagra, elephantia-

asis, and probably that peculiar affection denominated the induration of the cellular tissue of newborn infants. Otto comprises also phlegmasia dolens under the class of lesions of this tissue, which arises from chronic inflammation; but we have not sufficient evidence of this origin. Indeed, facts, as far as they have been ascertained regarding it, very conclusively show, that other structures besides this are affected at a very early period of the progress of this disease.

6. *D. Infiltrations*, or effusions of fluids from the circulating vessels, frequently take place in this tissue, and constitute the prominent phenomena of various diseases. *Hæmorrhages* sometimes occurs in it, either from external injuries, or from internal causes affecting the vitality of the system and the states of the capillaries and circulating fluids. When it originates in the latter source, the effused blood is usually infiltrated into the interstices of the structure in circumscribed spots, forming ecchymoses, and sugillations, as in scurvy and purpura hæmorrhagica, &c. When the hæmorrhage is extensive, it is commonly owing to the rupture of an aneurismal vessel or varix. The infiltration of serous fluids is very common, either in circumscribed parts (*œdema*), or more or less generally, although in different degrees, in the greater part or the whole of the body (*anasarca*). This preternatural increase of the serosity usually moistening the cellular tissue is owing to various causes, explained in the article *DUOVSX*; and chiefly to increased exhalation, either from augmented deturgescence of the circulation, or deficient tone of the exhalants, or both, — to impeded absorption, either from obstructed circulation in the veins or inactivity of the absorbents, — and to oppletion of the vascular system by the serous or watery parts of the blood, from obstructed elimination by the kidneys or by the respiratory and digestive mucous surfaces, and by the skin. A general state of very slight œdema, or an unusual fullness, softness, and flaccidity of the cellular tissue, — a condition obviously depending upon its laxity or deficient cohesion, conjoined with the presence of a greater proportion of watery fluid than in the healthy state, — not infrequently also is observed, particularly in phlegmatic and lymphatic constitutions. This has usually been termed *leucophlegmasia*; and although it may not amount to actual disease, yet it undoubtedly forms the first stage of several slowly formed maladies, and is usually attended with that state of the frame described in the article *CACHEXY*. It is of importance to attend to the chief pathological relations of this state of the cellular tissue, as they furnish useful indications respecting the nature and treatment of various diseases with which it is often connected. It commonly proceeds from an originally weak conformation, subsequently heightened by diminished vital power of the system in general, and defective cohesion of this tissue in particular.

7. The urinary secretion sometimes escapes into the cellular structure, which it violently inflames; the part thus infiltrated being usually affected by the spreading form of the disease, and the constitution thereby suffering most severely, as in other cases of this state of inflammation. This tissue is sometimes also infiltrated by *airiform fluids*, constituting the *emphysema* or *pneumatosis* of authors. This species of infiltration arises either

from the escape of air into the cellular substance, owing to laceration of some part of the respiratory mucous membrane; or from a morbid secretion by the vessels in certain advanced stages of disease, as in the last period of some forms of inflammation. (See art. *EMPHYSEMA*.)

8. *E.* The cellular tissue is also very frequently the seat of a great variety of *morbid growths*, and formations of a specific and malignant kind. Amongst these, the most important are simple serous cysts, hydatids, tubercles, melanosis, earthy and bony concretions, the vascular sarcoma of *ABERNETHY*, &c. These adventitious productions very often commence in some part or other of this tissue, even when they are found in other structures; the matrix, or medium of connection furnished by it to other textures and organs, being most frequently the point of origin. Certain *parasitic* animals, especially the larvæ of the *æstrus*, *filaria*, and *cysticerci*, are also occasionally met with in the cellular membrane. Changes of colour are not unusual, most commonly in consequence of biliary obstruction, giving rise to jaundice; and of certain malignant fevers, when it is either yellowish or yellowish green, and deficient in its vital cohesion.

CELLULAR TISSUE—DIFFUSIVE INFLAMMATION OF THE. CLASSIF. III. CLASS, I. ORDER (Author).

9. *DEFIN.*—*Severe constitutional disturbance, either preceding or following intense pain and diffuse swelling of some part of the cellular tissue, with rapid pulse and depressed vital power.*

10. The parts of the cellular tissue chiefly affected, according to Mr. HUNTER and Dr. CRAIGIE, are those in which the adipose substance is most abundant. In respect, however, of its seat and nature, this important malady has been much misunderstood, owing to the circumstance of its most commonly occurring as a complication with diseases of those structures, whose anatomical connection with this tissue is extremely intimate. Dr. DUNCAN, to whom we are indebted for the most comprehensive account of it which has hitherto appeared, has erred in considering other maladies, thus contingently related to it, as forming varieties of it, rather than as being occasional complications with it. It is true, that, while diffusive inflammation of the cellular structure arises primarily, constituting the only or principal complaint, it is also associated (generally in a secondary form, or in consequence of the extension of inflammation from immediately adjoining tissues) with inflammations of absorbing vessels and glands, with phlebitis, with inflammation of the fasciæ, and most commonly with erysipelas; these generally proceeding from the same causes, and from similar states of constitution and vital energy of the patient, as occasion it; and one or other of these diseases often appearing simultaneously with it. But, when thus associated, it may constitute either the least, or the most remarkable part of the malady; and, therefore, in such cases at least, can only be viewed as a more or less important part of a complicated disease.

11. I. CAUSES.—*A.* The *predisposing causes*, as far as they are ascertained, are epidemic states of the atmosphere; impure conditions of the air originating in local sources, particularly the foul air of crowded or imperfectly ventilated hospitals and apartments; morbid accumulations of bile

in the gall bladder and ducts, and of sordes, &c. in the prima via; lowered vital power, from whatever cause; the use of unwholesome food, a cachectic habit of body, and deranged state of the digestive functions, or of the secretions.

B. The exciting causes are chiefly local injuries and sprains, especially punctures and abrasions; venæsection and the ligature of veins; the inoculation of various animal poisons, generally of a septic tendency; acrid substances, or vegetable or animal matters in a state of disease or decomposition, applied to the cellular tissue; and even the simple contact of morbid secretions and fluids with any part of the body. The numerous instances which occurred a few years since in Plymouth Dock, and described by Dr. BETTER and Mr. THREPE, were chiefly referrible to epidemic or endemic states of the air; were generally excited by local injury; and were complicated with erysipelas.

12. II. SYMPTOMS. — A. The local symptoms are variously modified, according to the causes by which the disease is produced. a. In some cases it proceeds with very severe lesion of the part to which the cause is applied, as when the fluids and secretions of a diseased animal come in contact with the skin, and give rise to the disease called "*pustule maligne*" by the French, or malignant anthrax. In this case the morbid matter produces a vesicle, from its effects on the rete mucosum, followed by a tubercle, arising from the extension of the inflammation to the true skin, whence it penetrates to the subjacent cellular tissue. Its progress then is very rapid and alarming. A considerable swelling now extends to some distance, presenting a peculiar character. The surface of the skin is shining, and the swelling is elastic, diffused, and resisting, with a throbbing pain and sense of heat, followed by a feeling of torpor, tightness, and weight of the part. This morbid state extends in all directions; and, upon examination, excites a sensation between the softness of œdema and the elasticity of emphysema, to which the terms *boggy*, or *doughy*, have been applied. The central parts generally soon become entirely deprived of life, and the mortification glides below the skin, and destroys the cellular tissue all around; the constitution being most seriously affected. A nearly similar state of the part primarily injured not infrequently follows the application of various acrid matters, animal or vegetable, directly to the cellular tissue itself. Punctures, also, which penetrate as far as this tissue, or mere abrasions of the cuticle, may also occasion it; the chief difference being in respect of the extent to which the skin is affected. In some of such cases, particularly when punctures are the cause, either with or without the application of morbid matter, the skin is very slightly diseased, although the cellular tissue is very extensively destroyed; whereas, in other instances, especially when the cuticle is abraded, or when acrid matter is applied externally to the skin, this structure is very manifestly inflamed at the same time, and the malady presents the characters of erysipelas, complicated with this affection of the cellular membrane.

13. b. When the disease arises from punctures, mechanical injuries, chemical irritants, and sometimes from wounds received in dissection, the constitutional disease is, as in the foregoing in-

stances (§ 12.), preceded by the local affection. The mischief commences in the seat of injury, and extends from thence to the trunk of the body, and sometimes also in an opposite direction, without leaving any interval apparently sound. The progress of this variety differs greatly in different cases; being in some confined to the limb, or part of the limb, to which the cause is applied, and in others proceeding rapidly to the trunk, and terminating fatally. In a few of the instances following venæsection, the puncture heals as usual, and either remains permanently united, or opens again, and gives vent to some purulent matter; but more commonly union does not take place; the lips of the incision remaining slightly swollen, red, and everted. Some ichorous or puriform discharge appears, and disease extends continuously from the wound to the shoulder or breast.

14. c. In the most dangerous form of the malady, as that consequent upon the inoculation of a virus or morbid matter, a vesicle or pustule forms in the part to which the poison is applied, with very remarkable constitutional disturbance, followed by severe diffusive inflammation of some part of the cellular texture, generally on the same side with that on which inoculation of the disease took place, but at a distance from it, and not continuously with the primary pustule. In such cases, the manner in which the malady is propagated from the local injury, — which is most commonly in the fingers, — to the seat of the diffusive inflammation, which is usually in some part of the trunk, has not been satisfactorily shown. It has been supposed to pass along the absorbents, and, arriving at the axillary glands, to excite inflammation in them, extending to the surrounding cellular tissue; others have thought that the process takes place along the veins; but the accuracy of either of those views has not been demonstrated by dissection, both these sets of vessels having been found free from disease in cases of this description. The history of this most dangerous malady, and the nature of the cause which excites it, render it more probable that the morbid impression is made upon the organic nerves of the part, and that the frame is soon generally affected, owing to the anatomical and functional relations of this system of nerves; the intimate connection of which with the blood-vessels disposing the consecutive diffusive inflammation to appear on the same side with that on which the morbid impression was first made. The primary pustule is usually of very little extent or severity, often heals before the consecutive inflammation takes place, and is evidently the local effect of the virus upon the capillaries of the part to which it was applied. But it is quite insufficient to account for the rapid and violent constitutional disturbance which follows, and which can only be explained by referring it to the change produced by the morbid matter in the organic system of nerves primarily, and consecutively in the vascular system, and in the blood itself.

15. The chief and not infrequent illustration of this form of the disease is furnished us in the cases which follow punctures received on opening recent subjects. In the course of ten or twelve hours from the time of sustaining the injury in the finger, or not until after five or seven

days, the patient complains of rigors, remarkable debility, and frequency of pulse, with sickness at stomach, retchings, &c. A pustule appears in the part, but not always; and generally no connection can be traced between it, even when it is formed, and the diffusive inflammation which takes place during the progress of the constitutional affection. In some cases, a few red lines may be traced, or swelling of the surrounding part is observed; but neither advances any distance, the parts above being perfectly sound. In the course of the violent fever induced by the inoculation in the hand, the consecutive inflammation usually appears in the axilla, and extends towards the sternum, along the neck, down to the loins or haunch, or even to the thigh of the same side. In some instances, it terminates at the mesial line; in others, it passes continuously to the other side. It occasionally is translated from one side or part to the other, by a kind of metastasis, as in gout or erysipelas.

16. The inflammation of the cellular tissue of the trunk, whether arising from a continuous extension of the disease from the arm, or part originally affected, as in certain states of the disease (§ 12, 13.), or in the course of the constitutional commotion (§ 14.) excited by the inoculation of a morbid virus, always possesses peculiar characteristics: it is diffuse or extensive, without the smallest tendency to point; being flatly elevated above the sound parts, usually by a raised or defined margin. It is smooth and equal, without central hardness, and with all the characters already noticed (§ 12.). In general, no chords, which can be supposed to be diseased lymphatics, veins, or arteries, can be traced under the surface, and the glands are either very slightly or not at all enlarged. The diffused swelling commonly furnishes an obscure sense of fluctuation; but, frequently, when punctures have been made into it, little or no discharge has been procured.

17. The *pain* of the swollen part is most acute in every instance, whether the swelling be in an extremity, or extend along it to the trunk, or commence in the trunk itself; and it is quite independent of whatever affection of the skin may accompany the malady. In some cases, the integuments present not the least redness, although the cellular tissue has extensively suppurated, or even sphacelated; but the skin is commonly more or less affected, although in a secondary manner, in consequence of the extension of disease from the cellular tissue to it, and generally subsequently to the manifestation of acute pain. In the advanced stages, the skin has often a reddish or pink coloured blush, and occasionally a mottled or livid hue. In some cases, at a still further advanced period, solitary vesicles form over the diseased cellular tissue, and contain a serous, or sero-sanguineous, or ichorous fluid. The temperature of the part is sometimes much below natural.

18. *B. The febrile commotion*, whether appearing consecutively of the diffuse inflammation, directly produced in the part primarily injured, or previously to the affection of the trunk, is of a typhoid or adynamic type, and is accompanied with the most marked disorder of the nervous system, with anxious collapsed countenance, and frequency of pulse; more particularly when excited by the inoculation of a morbid matter, as by

wounds from dissecting recent subjects, and when preceding the disease of the cellular tissue of the trunk. The fever sometimes commences insidiously, but more frequently in a very evident or tumultuous manner. The pulse soon becomes very quick, sharp, broad, soft, or compressible. The patient lies in the supine posture, with depressed shoulders, and without turning to either side. Delirium is common, but it is generally intermittent; and profound coma is rare. The respiration always is quick, laborious, and painful, partly owing to the inflammation of the cellular tissue of the side of the thorax, and its extension to the costal pleura. As the disease advances, the peculiar cadaverous factor emitted by the patient, the yellowish or lurid hue of the surface, the offensive and sometimes coloured sweat, which, in rare instances, proves critical, and the tendency to ulceration in the parts pressed by the weight of the body, show that the blood, the secretions, and the soft solids, are more or less contaminated. Towards a fatal close, the raving delirium is often accompanied with muttering, and starting of the tendons; and alternated with stupor; the breathing becoming panting, laborious, or interrupted.

19. The *TERMINATIONS* of the disease vary with the exciting cause, the state of the patient's constitution, and the part primarily affected. When it arises from mechanical causes, as after venæsection, simple puncture, &c., it may terminate with spreading *suppuration*, which may or may not be attended by *sloughing* of the cellular structure: and this result may occur both in cases which end fatally and in those that recover; a partial regeneration of this tissue taking place in some of the latter. In the milder cases, the inflammatory action changes its character, and shows a tendency to stop; the disease terminating in phlegmonic suppuration and granulation. If the cellular substance adjoining a serous membrane become affected, this latter participates, and the inflammation spreads rapidly over it, generally producing an effusion of sanguineous serum; but sometimes, also, adhesion of the opposite surfaces. Occasionally the adjoining periosteum becomes diseased, and even the cartilages and bones denuded. A fatal termination occurs either rapidly from the intensity of the disease, or more slowly from some one of its sequelæ: and usually takes place, in the first instance, in from four to fourteen days; in the second, not till after two or more weeks, or even longer; but the common period is from the sixth to the tenth day.

20. III. *APPEARANCES ON DISSECTION.*—Dr. DUNCAN has given a very minute and accurate account of the successive changes that take place in the diseased structure. As the malady often attacks progressively various parts, it is sometimes found after death, in all its stages, in the same subject. In the part last affected, which is frequently the space between the last ribs and the os ilium, the cellular substance is merely oedematous, with increased vascularity; the infiltrated fluid being either limpid or tinged with red, and readily flowing from the divided tissue. In a more advanced stage, the effused matter is less fluid, often higher coloured, but not yet puriform. The diseased structure is next found gorged with a white semifluid matter, which greatly aug-

ments its thickness, separating the particles of fat at a distance from each other, but does not flow from the incision. In a subsequent stage, this matter is opaque, whitish, or reddish, or greenish, but is now so fluid that it flows from the incision. It is still, however, contained in the cells of the tissue; and it is only in the last stage, and after the texture of the part is entirely broken down, that this puriform matter is met with in collections, mixed with portions of the sloughy tissue. At this last stage the matter is not circumscribed by any cyst, or defined cavity, but is gradually lost in the adjoining cellular substance, without any line of demarcation. (See art. *ABSCESS*, § 15.)

21. The cellular tissue itself is usually gray or ash coloured. It is detached extensively from the textures it connects, or adheres to them and the skin in sloughy shreds; and long sinuous cavities are found between the tendons or muscles. The muscular structures adjoining are generally more or less diseased, the inflammation extending to their interfibrous cellular tissue; which, however, does not appear to be alone affected, the muscular fibres having their colour altered, and being more easily torn than in health. As respects the blood-vessels, the number of visible red arteries is increased, and the veins are enlarged, and turgid with black blood. Mr. J. HUNTER states that he found, "in all violent inflammations of the cellular membrane, whether spontaneous or the consequence of accident, that the coats of the larger veins passing through the inflamed parts became also considerably inflamed; and that their inner surfaces take on the adhesive, suppurative, and ulcerative inflammations; for in such inflammations, I have found in many places of the veins adhesion, in others matter, and in others ulceration." (*Trans. of Soc. for Improvement of Med. Knowledge*, 8vo. Lond. 1793, p. 18.)

22. The lymphatic vessels have not been sufficiently examined. The axillary glands have, however, been observed somewhat enlarged, and embedded in the diseased cellular tissue. Dr. DUNCAN states, that, although a tender and swelled axillary gland has been frequently mentioned as one of the first symptoms observed, he has never found them so much changed as at all to support the idea that their affection was the primary cause of the alteration of the surrounding parts. The state of the *fasciæ* has been very generally overlooked in dissections of fatal cases of this malady, as well, indeed, as that of the blood-vessels and lymphatics; but the *fasciæ*, tendinous expansions, sheaths of tendons, &c. are not always unchanged, although they appear not to have suffered in some instances. The skin is often severely affected, but not essentially or primarily, in the idiopathic form of diffuse inflammation of the cellular texture.

23. IV. DIAGNOSIS AND COMPLICATIONS.—*a.* Diffuse inflammation is readily distinguished from phlegmonous inflammation of the cellular tissue, by the circumscribed hardness of the latter, by the elevation of the tumour, and its pointing and becoming soft in the centre; and especially by the phlogistic character of the attendant fever, which will also indicate the nature of the disease, when phlegmonous inflammation is seated beneath *fasciæ*. In the less severe cases of the diffuse disease, particularly when it is principally

seated in those parts to which the exciting cause has been directly applied, and when it has been judiciously treated in the early stages, a disposition to pass into the phlegmonous state, by the formation of coagulable lymph, and the limitation thereby put to its extension, are very generally observed. Indeed, this change of character constitutes the favourable termination of the disease; although it may also occur as a complication in unfavourable or even fatal cases, especially when veins or *fasciæ* are also affected.

24. *b.* Diffuse inflammation of the cellular tissue is often consequent upon erysipelas, or complicated with it, particularly the *erysipelas phlegmonodes*; the difference between them consisting in the circumstance of this tissue being primarily and mainly affected in the former; and consecutively of the inflammation of the skin, in the latter.

25. *c.* Inflamed veins may be distinguished from this disease, when they can be felt stretching like chords in the direction of the swelling, and when the pain and tenderness on pressure are chiefly limited to the same line. There is usually, also, little or no affection of the skin, even secondarily, and the disease is generally more confined to a limb; fulness of the pectoral, cervical, and lateral muscles and surface being commonly wanting. (See *VEINS—Inflammation of*.) When the tumefaction is very great, it is extremely difficult to determine respecting the affection or non-affection of the veins: the consecutive inflammation of these vessels, however, and its complication with this disease, is very common, as Mr. HUNTER has so accurately stated, and more recent researches have confirmed.

26. *d.* The diagnosis between this malady and inflamed lymphatics is also extremely difficult, owing chiefly to the same cause, namely, to the œdema and congestion of the surrounding and distal cellular tissue consequent upon the obstruction of these vessels in the inflamed state. The existence of superficial red streaks, not connected with veins, running along an extremity from the part where the exciting cause is supposed to have been applied, and swelling of the lymphatic glands to which they lead, are the only proofs we usually possess of the lymphatics being diseased; and the absence of their appearance is the chief evidence of their being unaffected. But, as in cases of inflamed veins, diffuse inflammation of the cellular substance very generally follows inflammation of the absorbents, as satisfactorily shown by ABERNETHY, JAMES DUNCAN, and BRISSEAU. The difficulty of diagnosis, however, in a great proportion of cases, excepting at their commencement, must be evidently owing to the very sufficient reason of their co-existence.

27. *e.* The same circumstance also explains the difficulty sometimes found of distinguishing the disease from inflammation of the *fasciæ*; for in the majority of instances, the affection commences in the cellular tissue, and extends to the *fasciæ*, this latter structure being very rarely inflamed primarily, unless after it has experienced some external injury. Even when the *fasciæ* is primarily inflamed, it will not be possible, on some occasions, to form an accurate diagnosis, as disease commonly extends thence to the cellular tissue on each side of it. When the *fasciæ* is affected,

either primarily or consecutively, contraction of the limb is generally occasioned: but this is insufficient evidence of inflammation of the fascia, as inflammation and distension of the parts inclosed by it will produce this effect. When the disease commences in the cellular tissue, and extends to that portion enclosed by fascia, or to this structure itself, the skin is often unaltered even in colour. In a most severe case, attended by Mr. PARKER and myself, the whole leg and thigh, to far above the hip, were affected, and the limb contracted, and yet the skin was natural. The inflammation may, however, originate in the skin, extend to the subjacent cellular tissue, thence to the fascia, and, ultimately, to the cellular tissue beneath it; forming an important variety of erysipelas, well described by Mr. COPLAND HUTCHISON, and constituting the triple complication of diffuse inflammation of the cellular substance with that of the skin on the one side, and with that of the fascia on the other, the first being most extensively and destructively diseased. The local and constitutional suffering in such cases chiefly arise from the pressure made by the fascia upon the inflamed and tumid cellular tissue underneath it.

28. *f.* Whilst it is important to distinguish between *injury or inflammation of a nerve*, and this malady, it must not be overlooked that the one is often associated with the other; priority of affection in respect of either being the chief object of diagnosis. When, after a puncture or other local cause, *vees*, *rute* pain is complained of, particularly in the situation and the course of a nerve, with severe or obstinate symptoms of great nervous irritation, convulsions, &c. accompanying it, we may conclude that the disorder has originated in a nerve; and, if to those symptoms are added the diffuse, boggy swelling, &c. already described (§ 12.), we may likewise infer that diffuse inflammation has subsequently attacked the cellular tissue.

29. *g.* I have met with some instances of diffuse inflammation of the cellular tissue as a complication and termination of several severe or fatal states of disease in the *puerperal state*, both with and without affection of the skin; but only in the wards of a lying-in hospital. They have appeared in two forms: 1st, In the advanced progress of *asthenic inflammation of the uterus*, attended with an excoriating and foetid discharge, which has first irritated the skin about the nates, —the cellular tissue underneath becoming diffusely inflamed to a great extent, and destroyed; and, 2d, After cases of inflammation of the uterine veins, evidently in consequence of the vitiation of the circulating fluid. Dr. OTTO, Dr. DUNCAN, and Dr. CRAIGIE, refer *phlegmasia dolens* to diffuse inflammation of the cellular substance. But, I think, on insufficient evidence. If this tissue be really inflamed in that disease, other structures participate; and it certainly is not the part first affected. In the cases which I have seen examined after death, —only three in all,—the nerves and veins were the parts to which the symptoms of disorder were first referred; the veins being obstructed in all the cases. (See *PHLEGMASIA DOLENS*.)

30. *h.* The cellular tissue of the side of the neck and throat is sometimes diffusely inflamed, apparently from an extension of disease, in an-

gina maligna, and worst form of scarlet fever, the patient sinking from it rapidly. I have, however, met with one case of this description, where recovery ultimately took place. This disease also rarely occurs near the anus, or about the buttock and perinæum, in the course of fevers, dysentery, &c. But it is more disposed, on these occasions, to limit itself, and to terminate in suppurating abscesses. When it occurs in aged persons, from the escape of urine into this tissue, it generally extends rapidly and terminates fatally; and a nearly similar result follows its appearance after important surgical operations, as after lithotomy, amputations, and the ligatures of veins and arteries for aneurismal dilations of them.

31. V. PATHOLOGICAL INFERENCES. — *a.* Conformably with recently accumulated facts connected with diffusive inflammation of the cellular tissue, it may be concluded that it presents various morbid associations and grades of intensity, as well as distinct relations to the attendant constitutional disturbance, according to the diversified causes which occasion it: — 1st, That depressed vital power, or a previously disordered state of the chylopoietic viscera, or general cachexy, is often requisite to its occurrence: 2d, That abrasions, the irritation of acrid secretions or decomposed animal or vegetable matter, simple punctures, injuries received during the dissection of subjects in a state of incipient decay, and the contact of morbid fluids, most commonly produce the disease primarily in the part in which the injury is sustained, the mischief spreading continuously from thence; although occasionally appearing afterwards in other parts, without any continuous connection, when the circulation has become contaminated by the primary affection: 3d, That, when originating and spreading as now stated, sometimes the skin, at other times the veins, occasionally the lymphatics, on some occasions the *thecæ* or *fasciæ*, and more rarely the voluntary nerves, or any two or more of these, participate more or less in the disease: 4th, There appear to be other causes, which, acting in the manner of specific poisons, produce comparatively but little effect on the part to which they are directly applied; but which affect the system universally, chiefly by depressing and otherwise changing the organic, nervous, and circulating functions, the alteration of the cellular tissue appearing subsequently: 5th, That the local affection in this form of disease, which may be denominated consecutive diffusive inflammation of the cellular tissue, is often of very small extent compared with the severity of the constitutional disturbance; and, very frequently, appearances of contamination of the frame present themselves before the cellular tissue is affected, and even then the affection may be trifling, or even not recognisable (see *Poisons—Animal*): 6th, That the malady originating in the inoculation of a poison or virus, particularly during the examination of recently dead bodies, cannot be ascribed to inflammation of veins, or of lymphatics, or of nerves, or of *fasciæ*, or even of the cellular tissue itself; and that, although this last most frequently exhibits morbid appearances, yet are these appearances obviously contingent upon general disease of the frame, interesting in a special manner its various vital manifestations. (See *Author, in Lond. Med. Repos. vol. xx. p. 24. 1823.*)

32. *b.* As respects the association of the local and constitutional affection, all the cases of this disease may be divided into two classes:—

1st, Those in which the constitutional disturbance is mainly owing to the primary local lesion, or its extension, whether it be inflammation of the cellular tissue alone, or of this tissue associated with inflammation either of veins, lymphatics, thecæ, aponeuroses, or of the skin; the relation subsisting between the intensity of the primary local affection, and the constitutional disorder, being more or less apparent and co-ordinate (§ 12, 13.): 2d, Those in which the local lesion is obviously the least important change that has been induced, either directly by the exciting cause, or consecutively by the constitutional affection; and, even when it becomes the most serious, is manifestly the result of the constitutional affection (§ 14.), and disproportioned to it. Thus the local and the general symptoms are presented to us in a different order in these two forms of the disease. In the *first*, also, the febrile action is more inflammatory than in the second, but still partaking of the irritative character, as has been very justly insisted upon by Mr. TRAVERS. In the *second*, it is more asthenic; the nervous system is much more disordered; the anxiety, distress, and mental and physical depression, are greater than in the first; and all the organic functions more gravely affected; the blood, the secretions, and soft solids, becoming at last very evidently altered.* (See BLOOD, § 139. *et seq.*)

33. VI. PROGNOSIS.—The danger of this disease is much less when it is accompanied with inflammatory, than with adynamic or highly irritative fever, and morbidly excited sensibility. In general, the rapid extension of the disease from the arm to the trunk; great tumefaction of the region of the pectoral muscles; the first appearance of the inflammation in this situation, or in any part of the trunk, from causes which first occasioned serious constitutional disturbance; remarkable frequency of pulse following rigors, with anxious collapsed countenance, feretory eyes, delirium, difficult respiration, depression of mind, the accession of fresh rigors, extreme debility, and stupor; are all indications of great danger. The nature of the cause, also, should influence the prognosis. When it proceeds from the ligature of a vein, venæsection, and particularly from wounds in dissecting recent subjects, the danger is great. There is, however, less risk when the disease arises in the part to which the cause has been applied, and when the skin becomes much affected with a disposition of the inflammation to

limit itself, and form healthy pus, than when it appears consecutively of a pustule merely in the part inoculated, and of fever with extreme depression.

32. VII. TREATMENT.—*A. Prophylaxis.* Precautions are absolutely requisite when punctures are received in *post mortem* examinations, or when the cuticle about the nails and hands of the examiner is abraded. Some constitutions are more liable to be inoculated in this way than others, particularly persons who are out of health at the time, or whose vital energies are depressed. Wearing gloves during a morbid dissection may be of use in such circumstances. Dr. DUNCAN suggests the anointing of the hands with camphorated oil, or with simple axunge, before handling the viscera. Abrasions about the fingers should be protected by adhesive plaster. If, notwithstanding, punctures are received, or if an abraded or punctured part come in contact with any of the fluids or soft solids of a recently dead body, with animal or vegetable matter in a state of decomposition, with acid or morbid secretions, suction or perfect ablation of the part ought instantly to be performed; a pledget of lint, wet with either a strong solution, or the oil, of camphor (F. 449.), or with turpentine, applied to it, and the application covered so as to prevent its quick evaporation. On the several occasions of the employment of these means, in the persons both of myself and of my medical friends, no disturbance has accrued from these accidents. Two partial excoriation, however, have occurred, but in such a way as to confirm the propriety of this practice, and illustrate the nature of one form of the disease. The punctures, in these two cases, were received when examining the bodies of females who had, but a few hours previously, died of malignant puerperal fever; and the application was not resorted to until after leaving the apartment where the inspection was made. In one of those cases, that of a pupil, — camphor was used; in the other, — that of my friend, Mr. CHURCHILL, — ammonia was employed. Both these gentlemen experienced, within twenty-four hours afterwards, considerable general disturbance, with sickness at the stomach, and nervous depression and debility. All disorder, however, disappeared in a day or two after the exhibition of warm diaphoretics and stimulants; but in neither case was the least irritation observed in the part punctured. The morbid impression was evidently made upon the organic nervous system, as evinced by disorder of the functions more immediately dependent on it; but was not so intense, relatively to the state of predisposition, as to occasion further disease. As to the use of ligatures, &c., I must refer the reader to what I have stated respecting them in the article on *Animal Poisons*.

35. *B. Curative treatment.* — *a.* It will be evident, from the history of diffusive inflammation of the cellular tissue, that *local means* are chiefly applicable to certain of its states and complications. When the primary local affection is attended by much pain, both cold and warm applications have been recommended by different writers. The choice, however, between them, may be determined by the sensations of the patient: but warm fomentations, unremittingly employed, appear to me the safest, particularly when inflam-

* It may be stated at this place, that the disease which has been observed to follow inoculation of an animal poison during the examination of recent subjects is obviously distinct from diffuse inflammation of the cellular tissue, although this local affection, or some modification of it, often takes place in the advanced stage of that disease, which has accordingly been referred to in this article as one of the chief causes of the lesion now under consideration. The subject is, however, considered more fully in the article on *Poisons*. In justice to myself, I should state, that I published, in the *London Medical Repository* for July, 1823, p. 21—27, some remarks on the nature of the malady infected by inoculation from recent subjects, and the operation of animal poisons on the economy; and I request the favour of the reader who is interested in these important subjects to refer to these remarks, and to the conclusions, to which Mr. Travers has come, in his work on *Constitutional Irritation*, p. 413, Lond. 1826.

mation is externally apparent. When the local affection is limited chiefly to the part to which the cause was applied, or its vicinity, the detraction of blood from it by *leeches* or *scarifications*, and *incisions* through the integuments, ought not to be neglected. The latter of these two modes of local evacuation, as first recommended by Mr. COPLAND HURCHISON, is evidently the most beneficial, not merely by procuring a more decided and rapid discharge, but also by giving an external outlet to the matter which otherwise would infiltrate the cellular tissue, and extend the mischief. Even in cases of great vital depression, and when the cellular tissue is consecutively diseased, incisions should not be neglected; they being compatible equally with an *æthergetic*, tonic, or stimulating treatment, as with its opposite: and they are not the less necessary in the early stages than at later periods, and when fluid is diffused through the cellular structure. When the part affected is deeply seated, they should be deep and large, so as fully to reach it; their number being proportionately diminished. But the great object is to make a free passage for whatever fluid matter may have formed, or that will form subsequently. This practice has received the approbation of Dr. DUNCAN, and the best recent writers on this disease; and its propriety has satisfactorily been shown in those cases which have fallen under my own observation.

34. *b.* The *general means of cure* are usually directed with the intention of subduing the local affection, and more especially the state of high nervous sensibility and vascular irritability which exists, whether this state be consequent upon the primary lesion produced by the exciting cause, or whether it be the immediate effect of that cause, and the antecedent of any affection of the cellular tissue, as in cases of inoculation by morbid matters or animal poisons. But, although this intention is generally kept in view, very different, and even opposite, measures have been recommended for fulfilling it. It is evident that the same measures are not suitable to all states and periods of the disease; and possibly to this cause may be imputed the great diversity of means which have been advised, and the partial success attributed to very opposite methods. Much also is owing, more generally than has been admitted, to the constitutional powers of the patient. A number of practitioners and writers advocate general blood-letting, and trust chiefly to it for the fulfilment of the above intentions, without adverting to the fact, that the morbid states forming the essential characters of the disease are, in their severest and most deadly forms, independent of sthenic action, and cannot be either limited or subdued by venæsection, although it may be required to a moderate extent; particularly when the local affection arises primarily and directly from the exciting cause, implicates any of the parts which I have noticed as being involved in its complicated forms, and is chiefly antecedent of the grave constitutional disturbance characterising the advanced stages of disease. But even in such cases, the depletion should be practised early, and confined chiefly to young, plethoric, or robust persons; the local evacuation consequent upon free incisions being sufficient in most cases. In other respects, the treatment in this form of the disease may be

similar to that recommended in inflammation of the veins; for the principle acted upon by Mr. JOHN HUNTER in respect of that malady, and which is founded in accurate observation, is equally applicable to this — namely, to impart energy to the system, so as to enable the vessels to form coagulable lymph, by which the extension of the morbid action may be limited, and a diffusive or spreading inflammation may be converted into the phlegmonous state. This practice is still more imperatively required in the other form of the disease, or that in which the affection of the cellular tissue is consecutive of a constitutional disturbance, excited by a morbid virus or animal poison.

35. The frequent inefficacy of depletions and the antiphlogistic treatment, and even their injurious effects, as shown by the rapid sinking consequent upon them, are fully demonstrated by the history, given by Dr. BUTLER, of the disease which occurred in Plymouth Dock, and by the cases after wounds in dissection recorded by various writers. The instances of recovery after this practice cannot be brought as evidence of its efficacy; inasmuch as the smallness of their number; the tonic treatment, which, in several of them, followed vascular depletions; and constitutional energy; may be adduced to disprove it. After studying the cases which have been published by Dr. DUNCAN, Dr. COLLES, Mr. TRAVERS, Dr. DEASE, Dr. BUTLER, &c., and reflecting on my own limited experience, I would strenuously recommend the following measures, in addition to those already advised: — As to the question of blood-letting, that is already disposed of; but I may further add respecting it, that, however great the severity of the pain, or the sensorial excitement; or however frequent, open, sharp, or bounding the pulse; these symptoms should be arguments against, rather than in favour of venæsection. But if the pulse be not remarkably frequent, or if it be firm and constricted, then this operation ought to be performed. Yet I should expect little or no advantage from this practice, in those cases of the disease which proceed from the inoculation of putrid or morbid animal matters or poisons, whatever the character of the pulse may be. It is, however, seldom such as can warrant depletion in these cases; being generally of the former description, and rarely of the latter. The object which we should propose to accomplish, next to that already stated, is to rouse and support the energies of life, and thus to oppose to the extension of the disease an augmented vital resistance. This can be done only by a stimulating and tonic treatment, and by the expulsion from the frame of such impurities and morbid matters as may tend to impede the natural functions, and depress their energies. The means which we should employ with these views, if judiciously selected, will be more efficacious than any other for the fulfilment of the intention proposed above (§ 34.). The agents which I have found most successful in attaining them, are large doses of camphor, with opium, sometimes also with calomel, and the occasional exhibition of spirits of turpentine, either alone or with castor oil, and of one of the enemata (F. 148, 149.) contained in the Appendix. The plan I have followed in several cases of this disease, mostly of a more or less complicated

nature, which I have treated, has been to give the following bolus, or the pills first prescribed; and a few hours afterwards the draught, which, in three or four hours, should be followed by an enema (F. 151).:—

No. 104. R. Camphoræ rase gr. x.—xv., Hydrarg. Submur. gr. x.—xx.; Opi Puri gr. jss.—ij.; Pulv. Capsici gr. iv.; Conserv. Rosar. q. s. ut fiat Bolus, statim sumendus, et horâ post tres vel quatuor repetendus.

No. 105. R. Camphoræ rase gr. vij.—xij.; Ammon. Carbon. gr. xv.; Hydrarg. Submur. gr. xx.; Pulv. Capsici Annul. gr. viij.; Opi Puri gr. ij.; Mucilag. Acacæ q. s. ut fiat Pilulæ xij., quarum capiat binas omni horâ vel bihorâ.

No. 106. R. Olei Terebinthinæ 3 ss.—3 j. (vel etiam Olei Ricini 3 ss.); Olei Cajuputæ M vj.; Lactis Recentis 3 ij. Fiat Haustus.

36. If a free evacuation of the bowels be procured, the bolus and draught should not be repeated more than once; if the evacuation be scanty, they may be given a third time, having prolonged the period between the second and third doses; in the intervals between which, as well as subsequently, the following pills and draughts may be taken:—

No. 107. R. Camphoræ rase gr. iij.—v.; Ammon. Carbon. gr. iv.; Pulv. Capsici gr. j.; Mucilag. Acacæ q. s. M. Fiat Pilulæ ij., secundâ, tertîâ, vel quartâ quâque horâ sumendâ, cum Haustu sequente.

No. 108. R. Mist. Camphoræ 3 j.; Liq. Ammon. Acet. 3 jss.; Spirit. Æther. Sulphurici Comp. 3 j.; Tinct. Capsici Annul. M x.; Syrup. Aurantii 3 ss. M. Fiat Haustus, cum Pil. supra prescriptis cupiendus; vel.

No. 109. R. Infus. Cinchonæ 3 j.; Liq. Ammon. Acet. 3 j.; Spirit. Ammon. Arom. 3 ss.; Tinct. Capsici M xij.; Olei Cajuputæ M vj. M. Fiat Haustus, ut supra sumendus.

37. In the slighter cases, less active means will be found sufficient; but when the disease assumes a serious form, and particularly if the constitutional symptoms manifest themselves before the affection of the cellular tissue has commenced or made any sensible progress, the above or similarly active remedies must be energetically prescribed.

38. During the course of the more adynamic states of the malady, after alvine evacuations have been procured, I have seen the best effects follow the liberal use of wine, and large doses of bark with the aromatic spices. If the tongue and mouth be parched, the pills or bolus, and the turpentine draught, prescribed above, should precede the exhibition of the wine, bark, or sulphate of quinine. The irritability of the stomach and delirium, often accompanying the advanced stage of the worst states of the disease, being more readily allayed by powerful stimuli, as camphor, capsicum, ammonia, ether, spirits of turpentine, cajuput and other essential oils, wine, bark, sulphate of quinine, brisk bottled ale and stout, very small doses of opium, brandy, &c., than by medicines of any other description, it will be necessary to administer these, in forms of combination suited to the circumstances of the case; chiefly with the view of rousing and supporting the energies of life, changing the state of morbid action, and thereby preventing the extension of the local mischief, and the tendency to contamination of the fluids and solids of the frame. The regimen during the treatment should be in accordance with these intentions, and the patient should be allowed what he may crave for; as desire in such cases for articles of food, or for particular beverages, is the instinctive expression of the wants of the economy.

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CELLULAR TISSUE — INDURATION OF. SYN. *Edematis concrète*, Billard. *Sclérème*, Chaussier. *Squirrho-Sarqne*, Beaumes. *Skin-bound*.

CLASSIF. III. CLASS, I. ORDER (Author).

1. DEFIN. A wax-like consistence of the skin and sub-cutaneous cellular tissue, commencing in the hands, face, and lower extremities — the parts most remote from the centre of the circulation; often extending to the trunk, the parts being cold, often pale, yellowish, or rose-coloured, frequently mottled, or livid, with weak pulse and respiration, terminating in congestion of the lungs and asphyxy.

2. This affection was first described, in 1718, by J. A. UZEMEZIUS, physician to the hospital at Ulm, and afterwards more fully investigated by DOUBLET, ANDRY, AUVY, HUCLEF, DENMAN, and UNDERWOOD, as well as by several contemporary writers. It is very prevalent and fatal in some of the lying-in and foundling hospitals on the Continent, but is comparatively rare in this country, especially during recent times. Its nature and seat have been much discussed by foreign medical writers; and even at present, various points connected with its pathology are not fully established. It is, however, evident that the disease assumes various forms, and exhibits different morbid relations, which may be referred to the two following varieties.

Var. i. *Edematous Hardening of the Cellular Tissue*; *Sclérème adémateur*, CHAUSSIER and DUGES.

3. In this form of the disease, the sub-cutaneous cellular tissue is infiltrated with a yellowish coagulable albuminous serum; the limbs of the infant are more or less tumefied as well as hard, are somewhat rigid, and the skin assumes a violet tint, owing to the pulmonary congestion accompanying it; with weak oppressed respiration, and feeble irregular pulse. In some cases, it commences with simple oedema, particularly when it arises from exposure to cold. If the cold have acted upon the greater part or whole of the surface of the body, the affection is sometimes more or less universal, but usually most remarkable in the limbs. It rarely attacks the abdomen, chest, and neck. The parts diseased are cold, tumid, discoloured, insensible, hard, and receiving and preserving the impression of the finger when very firmly applied. During the progress of the affection, the cry becomes very weak and peculiar, dyspnoea increases; the thorax is dull on percussion; and the impulse of the heart, and the respiratory murmur, are found weak on auscultation.

tion. Death often follows in from four to eight days, without any convulsion, but generally preceded by a lethargic somnolency; and spasmodic attacks resembling slight trismus, and opisthotonos sometimes occur in the advanced stage. The indurated parts occasionally assume an erysipelatous appearance, and, in rare instances, pass into sphacelation. In favourable cases, or after an early and judicious treatment, the affection subsides; the hardness, and afterwards the œdema, disappearing in the course of two or three weeks. M. GARDIEN states, that he observed suppuration of the affected part to occur in one case only.

Var. ii. Induration affecting chiefly the Adipose Tissue; Sclérome concret, CHAUSSIER, DUGÈS; Skin-bound, of English authors.

4. This variety generally depends upon the sudden impression of severe cold; is comparatively rare, and is chiefly met with in lying-in and foundling hospitals. The cheeks, limbs, fore-arms, thighs, back, abdomen, chest, and neck, successively, or two or more of them simultaneously, assume a remarkable hardness, which yields not to the pressure of the finger. The temperature and sensibility of the surface are much depressed; and with difficulty raised. The skin is pale or yellowish, and wax-like; sometimes livid or mottled. Trismus and opisthotonos are more common in this, than in the preceding variety. There is little or no tumefaction or œdema; the skin being fixed and immovable upon the subjacent parts. In some instances, the extremities and back are somewhat emaciated, dry, and even rigid, particularly in the advanced stage; and the cheeks and temples are collapsed. At the commencement, the appetite and digestion are often not much affected; but during the progress, and towards the close of the disease, the bowels become more or less disordered. Dr. DENMAN and Dr. UNDERWOOD seldom met with it but accompanied with some bowel complaint. The infant soon becomes too feeble to draw the breast; it utters a peculiar moaning noise, or feeble whining cry; and has the appearance, even early in the complaint, of dying; and, at last, sinks apparently asphyxied. In favourable cases, the skin and extremities lose their hardness and rigidity, and the infant recovers gradually, if pulmonary inflammation does not come on, and carry it off. Inflammation of the indurated parts seldom or never appears in the course of this variety.

5. *PATHOLOGY.*—M. GARDIEN states, that he has sometimes remarked a slight increase of heat precede the insensibility, coldness, and hardness of the parts affected; but without any general febrile symptoms. The only indications of disorder he has observed to usher in either variety, are difficulty of respiration, and a peculiar feebleness of the pulse and of the voice. Somnolency or lethargy is very usual during the course of the disease, and, as M. DOUBLER observes, increases towards a fatal termination. The affection, particularly the latter variety, is rarely congenital. M. DUPARCQUE has detailed two cases in which the infant upon delivery was so hard and rigid as to resemble a mummy, the vessels of the umbilical chord being diseased.

6. *A. Causes.*—The different states of this disease have been attributed to a syphilitic taint. It is, however, most commonly owing to the

influence of cold upon new-born infants, and generally occurs from the second to the fourteenth day from birth. Imperfect or unwholesome nourishment, and the influence of a vitiated atmosphere, particularly the air of crowded hospitals, upon the imperfectly developed respiratory functions, are, in my opinion, amongst its most energetic causes. It is very apt to occur in prematurely born infants, in those of a feeble constitution, and who are deprived of the mother's or nurse's milk. M. PALLETTA remarks, that out of sixty-five cases, forty were prematurely born. M. RATIER states, that its dependence upon atmospheric cold is shown by the greater number of cases at the *Hospice des Enfants Trouvés*, when winter sets in. But as a free ventilation, and dissipation of the foul air of an hospital ward, are in some measure prevented during cold weather, the prevalence of the disease at this season may be equally owing to this circumstance. M. BILLARD has shown that the number of cases in the warm months is usually not much less than in the cold, in the above-named hospital. Dr. BRESCHI, however, states a fact, in his report of the Lying-in Hospital at Florence, which shows the great influence of cold in causing this affection. He observed the disease very prevalent during the winter season, especially if rigorous; and he consequently ordered the infant to be kept in the mother's bed, as warm as possible; and from that time no case of it occurred. M. SOUVILLE has met with the disease frequently in the northern departments of France, and also attributes it chiefly to cold, the influence of which is likewise admitted by PALLETTA. It sometimes, also, occurs in the course of the bowel complaints incidental to infants, particularly when improperly nourished; and it is frequently complicated with the jaundice of this epoch. M. BILLARD states that, in seventy-seven cases with œdematous induration, thirty were jaundiced.

7. *B. Appearances in fatal cases.*—In the first or most common variety, the cellular tissue is found loaded by a thick albuminous serum, which coagulates by heat, and which, according to M. LEGER and M. BILLARD, partly escapes upon dividing it. Dr. PALLETTA, however, states that, upon division, it remains firm and concrete, the infiltrated matter not escaping. In the second or more rare form of the affection, the cellular and adipose tissues are hard, concrete, and frequently of a deep yellow colour. The adipose tissue often presents a number of small dark yellow grains dispersed through it. The lymphatic glands, as well as the mesenteric glands, are enlarged; and slight serous or sero-albuminous deposition into the cellular tissue is observed throughout the body, with sanguineous or sero-sanguineous infiltration of parts of it; and effusion into the shut cavities. The vessels of the brain are usually congested. The cavities of the heart are loaded with blood; the foramen ovale is sometimes more open than it should be; the pericardium contains some sanguineous serum; the lungs are often congested or hepatized; and the larynx and epiglottis œdematous. The liver is frequently large and congested; the gall-bladder and hepatic ducts full of bile; and the gastro-intestinal mucous surface more or less inflamed. The most constant morbid appearances are the engorgement of the venous system; the dark or black state of

the blood; the accumulation of a thick, deep-coloured, viscid, or coagulated fluid in the adipose and cellular tissues, imparting to them a condensed or firm appearance; and the congestion of the thoracic viscera: but these latter are commonly not otherwise diseased.

8. *C. Proximate Cause.*—The first variety of this affection may be considered as a form of oedema; the peculiarity resulting chiefly from the thick, coagulable nature of the effused fluid, and the deficient development of animal heat in parts far removed from the centre of the circulation; in consequence of which the adipose matter either is secreted in a morbid state, or cannot be preserved in its natural semifluidity. The second or more rare form of the affection is chiefly to be attributed to this change of the adipose substance, which, owing to defective vital manifestation in the part, and the depressed grade of animal warmth, assumes the condition which it usually presents soon after death. M. DENIS supposes that the disease is connected with the gastro-intestinal irritation so frequently found upon dissection. Dr. HULME and, more recently, Dr. PALLETTA viewed it as consecutive of, and occasioned by, the congestion of the lungs and the difficulty of the pulmonary circulation; whilst M. BAXON, physician to the Parisian Hospital, in which from two to three hundred cases occur every year, considers that the internal congestion takes place subsequently to the appearance of the disease. I believe that this is the more correct view; for M. BILLARD found unusual congestion or hepatisation of the lungs in less than one half the cases he examined. There can be no doubt, however, that as the affection of the cellular tissue proceeds, and as the circulation in this tissue and in the extremities is more and more retarded, congestion of the internal viscera comes on; but not always in the same organ; the encephalon, cavities of the heart, liver, and spleen, also experiencing this change; sometimes with serous or sero-sanguineous effusion into the adjoining shut cavities. The frequent complication of the disease with jaundice would seem to indicate that the biliary organs are more or less affected; and such may be the case in respect of their functions: but M. BILLARD found, in ninety cases, twenty only of organic lesion of the liver, the icteric appearance being evidently dependent upon the morbid state of the serum of the blood, and the deficient vital endowment of the cutaneous capillaries. M. BRESCHET had found the foramen ovale more than commonly open in many cases, and inferred that the affection was caused by this circumstance. M. BILLARD states, that his numerous examinations do not countenance this inference, but admits that they are often coincident changes. This writer, who has paid much attention to the subject, concludes, that general debility, congenital plethora of the vascular system, congestion of venous blood in the tissues, and unusual dryness of the skin previous to the exfoliation of the epidermis, are its chief predisposing causes; and that vascular plenitude, an engorged state of the cellular and adipose tissues, and the influence of external agents interrupting cutaneous transpiration, are its more immediate causes; the coldness of the extremities and affected parts resulting from the

slowness of the circulation and the depression of the vital powers.

9. *DIAGNOSIS AND PROGNOSIS.*—A. This affection is obviously more or less intimately related to oedema on the one hand; and, in some instances, to erysipelas on the other:—to the former, by the effusion of fluid in the cellular tissue; but differing from it chiefly in the persistent, firm, wax-like, and coagulated state of the infiltrated part, and in the reddish yellow, livid, or mottled appearance of the skin;—to the latter, by its frequently dark red, or livid colour; but differing still more widely from it, in the principal affection of the cellular tissue, in the remarkable coldness of the part, languor of the circulation, and general absence of any change in the skin itself. And it is distinguishable from both, by the peculiar cry of the infant; the weak, moaning, and sibilant respiration, the dyspnoea, the feeble irregular action of the heart; the leipthymia and lethargy, and the frequent complication with trismus and tetanic spasm; as well as with the peculiar jaundice of infants. It may be also mistaken for *erythema nodosum*; but the knotted sensation, upon passing the fingers over the skin, furnished by this affection, is sufficient, of itself, to distinguish it from the smooth, cold, and diffused hardness of the present disease.

10. *B. The Prognosis* should be always reserved or cautious. A large proportion of those attacked die, particularly in hospitals, even under the most judicious management; sometimes, in two, three, or four days, in the most severe cases, and in prematurely born children that have been exposed, soon after birth, to cold. But, generally, the disease does not terminate either way in less than from six or eight days to twenty or thirty. It may even be more prolonged; and when recovery is advancing, inflammation of the lungs or digestive canal, or effusion on the brain, may occur, and either cut off the patient, or put his life in the utmost jeopardy.

11. *TREATMENT.*—The intentions of cure will vary with the particular form of the disease. In the *first*, or oedematous variety, in which vascular plethora is generally present, depletion is often of service; particularly if the circulation in the extremities and affected part be at the same time excited by means of frictions with warm stimulating liniments. MM. BAXON and BILLARD prefer frictions to the use of the vapour bath, recommended by MM. DUCÔS, PÉRISSOT, and others. In the *second* variety, in which there is less oedema, and greater induration, and, according to several recent writers, a coagulated state of both the adipose substance and the fluid effused into the cellular tissue, blood-letting may not be admissible. MM. CHAMON, PALLETTA, and GARDIEN, however, consider that, in this variety also, depletion should be practised, in order to relieve the cerebral congestion attending it; and therefore recommend two small leeches to be applied behind the ears. In this practice I have generally concurred, but have adopted it with much caution in prematurely born or weakly infants; directing, also, for all the states of the disease, calomel or hydrag. cum creta, with soda, and small doses of ammonia; the compound decoction of sarsaparilla with liquor potassæ; the warm bath, followed by repeated frictions of the surface with stimulating

liniments; and the nourishment Nature intended for the infant. Although a very common and fatal disease in France, it is seldom observed in this country; and even at the Infirmary for Children, cases of it have very rarely presented themselves. I have not met with an instance of it in the Queen's Lying-in Hospital.

12. After the above means have been persevered in for a time, a few drops of spirits of turpentine and sweet spirits of nitre may be given occasionally in sugared dill-water; and the infant enveloped in very soft flannel or wash-leather, which ought to be covered over with oiled silk, in order to prevent the dissipation of the animal heat. Dr. PALLETTA states that he treated, with uncommon success, the very numerous cases that occurred in the Lying-in Hospital at Milan, with half a grain of the *hermes mineral* (F. 637.) given three or four times a day, and warm bran or warm flour applied to the parts affected. ANDRY and GARDIEN advise the use of blisters; — the former to the affected parts; the latter to the nape of the neck, with the view of preventing the occurrence of cerebral congestion; — but I have had no experience of their use in this disease; and consider them less efficacious than frictions with stimulating liniments, several formulae for which are given in the Appendix. During treatment, a pure warm air, and the natural food of the infant, furnished by a healthy nurse, will be found extremely conducive to recovery.

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CEPHALITIS. See BRAIN, *Inflammation of*.
CHEST. SYN. *Thorax*, Fr. *Der Brustkasten*, Ger. *Torace*, Ital. *The Thorax*.

EXTERNAL EXAMINATION OF, IN THE COURSE OF DISEASE. — CLASSIF. GENERAL PATHOLOGY — *Semeiology*.

1. *Regions of the Chest.* — It is necessary to divide the chest into different regions, in order to give precision to our diagnostic researches. This is done by drawing horizontal and vertical lines from certain conspicuous parts of the body. The first horizontal or transverse line extends anteriorly from the humoral extremities of each clavicle, across the junction of the clavicles with the upper part of the sternum, posteriorly passing over the last cervical vertebra; the second, around the middle of the chest, anteriorly passing over the nipples, and posteriorly passing between the spine of the scapulae and their inferior margins; the third passes around the lowest part of the chest, from the zyphoid cartilage, and over the hypochondria. The first vertical line extends from the upper to the lower extremity of the sternum; the second and third, from each acromial extremity of the clavicles to the external rami of the pubes; the fourth and fifth, from each posterior margin of the axillæ to the crests of the ilia; the sixth and seventh, from the clavicular transverse line along the posterior border of each

scapula, or a little exterior to it, to the middle horizontal line; and the eighth, along the spinous processes of the dorsal and cervical processes. To these lines may be added one drawn on each side, from the last cervical vertebra, around the lower part of the neck, and sloping downwards to the upper part of the sternum. Thus the chest will be divided into sixteen regions, viz. *two superior*, or humoral regions; *four anterior*, — the subclavian and submammary; *four lateral*, — the axillary and subaxillary; and *six posterior*, — the scapular, subscapular, and interscapular.

2. The viscera lodged beneath each of the different regions of the chest, and the nature of its parietes, are too well known to require any notice. I therefore proceed to point out the various methods which are employed to investigate the diseases of the thoracic organs. These consist of *inspection*, *mensuration* and *manual examination*, *percussion*, *succussion*, and *auscultation*.

3. *A. Inspection.* — It is important for the physician to take into consideration the *form* and *size* of the chest, in estimating the causes, nature, and tendencies of disease. Vigour of constitution is generally incompatible with a small or ill formed thorax; this conformation not only disposing to various affections of the viscera contained in this cavity, but also aggravating their severity. Every change from the due proportions of the chest ought to be considered of importance. This cavity is generally artificially modified in its form in females. Its capacity is reduced in a transverse direction, by the lateral compression to which it is subjected; and, owing to the same cause, the superior abdominal viscera are pushed upwards, and it is thereby further diminished in a vertical direction. But the compression thus exercised not only reduces the absolute capacity of the chest, but it also prevents the elevation of the ribs, and the descent of the diaphragm during respiration, rendering each inspiration of small amount, and insufficient for the development and wants of the frame. It moreover presses the lower ribs downwards and inwards upon the more important viscera contained in the abdomen; prevents the ascent of the contents of the cæcum; and favours lateral curvature of the spine, which, in its turn, tends remarkably to diminish the capacity of the chest.

4. During inspection of the thorax, there are other circumstances, besides its form and size, which should fix attention. The actions of its parietes, the equality of the motions of each side, and their connection with the movements of the abdomen, are of the utmost importance. In pleuritis, the motions of the ribs of the affected side are greatly impeded; and if both sides be affected, the costal parietes are but little moved during respiration, this function being chiefly performed by the diaphragm and abdominal muscles. On the other hand, when the diaphragm, or either of its serous surfaces, are inflamed, or when intense inflammation affects any of the superior abdominal viscera, respiration is chiefly performed by the costal parietes. In the first case the respiration is said to be *abdominal*, in the second *thoracic*.

5. It is chiefly by actual inspection of the chest that we can ascertain the existence of oedema of its surface: the distance between the

ribs, the prominence of the spaces between each, the existence or non-existence of partial contractions, and bulgings or prominences of its walls, — are all important facts in our diagnosis of diseases seated in this cavity. Thus, in phthisis, when the pulmonary tissue is tuberculated, shrunk, or contracted, &c., a falling in of the ribs, particularly of the subclavian region of one or both sides, is observed; whilst in asthma and emphysema of the lungs, the ribs are full and expanded. This state, however, of the ribs may exist only on one side; as in cases of pleurisy of one side, terminating in effusion, in empyema, and in pneumothorax, we often observe the affected side expanded, and the intercostal spaces prominent, whilst the other is natural. In other instances of organic disease, one side may be uncommonly contracted; as after cures of old, or chronic, or circumscribed pleurisy, in partial or general destruction of one lung, and in lateral curvature of the spine. In many of these, the opposite or sound side is fully developed, owing to a slight hypertrophy of the sound lung; in cases of curvature, one side is always prominent in proportion to the depression of the other. The prominence of the sternum, and lateral depression of the ribs, which is so common in children; and the falling in of the sternum, and prominence of the ribs; are ascertained by inspection.

6. B. Manual examination and mensuration. — It is of importance to ascertain the existence of tenderness on pressure in various parts of the chest, particularly when the patient complains of pain, or difficult respiration. This can only be done by manual examination. Extreme sensibility of the external surface indicates either irritation of the membranes of the spine, or rheumatism affecting the parietes of the chest. When pressure in the intercostal spaces is required to develop the pain, disease is usually seated in the pleura, or parts beneath it, or in the pericardium. It is seldom, however, that we can occasion pain by pressing between the ribs in cases of organic disease of the substance of the lungs, or even of the pulmonic pleura, unless this latter has formed adhesions to the costal pleura. During manual examination, attention should be paid to the existence, the kind, and the extent of moisture on the surface of the chest; to its temperature, which is generally more or less increased in inflammations; and to the palpitations or impulse of the heart. It is evident that the existence of oedema or emphysema of the surface of the chest is chiefly to be ascertained by manual examination of it.

7. Mensuration of the chest may be sometimes required, in order to ascertain either the degree of prominence of one side, or of the contraction of the other. In both cases a piece of tape is used; the measurement being made from the spinous processes of the vertebrae to the central line of the sternum, and from the top of the shoulder to the lowest rib. The admeasurement should be taken during a full inspiration and expiration, and the progressive increase or decrease noted. It will often happen that no difference between either side exists during a state of tranquil respiration; and yet, upon forced respiration, the difference is very manifest.

8. Mr. Abernethy proposed, many years ago, — and the proposition has been recently revived on

the Continent, — to ascertain the capacity of the lungs, by measuring the quantity of air they are capable of containing, as an indication of the extent of disease by which they are affected. The recommendation was rational, and deserving of greater attention in several affections of this organ than it has received, particularly when the evidence furnished by the measure is duly estimated in conjunction with other signs. The method simply consists of the patient taking as deep an inspiration as he is able, and then expiring through a tube, one end of which is passed under a glass jar, containing, and inverted over, water. The quantity of water displaced is the measure of the capacity of the lungs. A person, full grown and in health, usually displaces from six to eight pints. If the amount be much less than this, it may be inferred that the lungs are obstructed by disease of their substance, or by tumours, effusions of fluid in the pleura, or other causes pressing upon them externally. Although muscular debility, or spasm, may diminish the quantity of air inspired, yet there can be no doubt that the method is calculated to furnish very useful information.

9. Some years since, it was proposed by a physician on the Continent, to test the capacity and soundness of the lungs by causing the patient to take as full an inspiration as possible, and to count from one upwards, in a deliberate manner, during the following expiration, and whilst expiring as slowly as he can. The number that will be reached, either during the expiration or whilst the breath is retained, or before a new inspiration is entered upon, will be an index of the soundness of this organ. Dr. LYONS, who has more recently recommended a modification of this method, advises that the period should be noted by the seconds hand of a watch. He states that a healthy individual will not continue counting above thirty-five seconds; and that, in confirmed phthisis, the period never exceeds eight, and seldom six seconds. I have practised this method during the last five years, and have seldom found a healthy person who could proceed beyond thirty-five seconds, and scarcely one who could go beyond forty; but I have met several cases of pulmonary consumption, where, up to a very advanced stage of the disease, twelve, fifteen, and, in one case, twenty seconds were reached; and even in the last stage, eight or ten seconds are not uncommon; although the number mentioned by Dr. LYONS is much more frequent.

Percussion, succussion, and auscultation of the chest are comprised in the articles AUSCULTATION and PERCUSSION.

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DEFORMITIES OF THE CHEST. — CLASSIF. I. CLASS, III. ORDER (Author).

1. I. LATERAL DEPRESSION OF THE CHEST. — Depression of the lateral parietes of the chest has escaped the attention of authors, although of very frequent occurrence, until M. DUPUYTREN wrote a memoir on the subject (*Repertoire Gén. d'Anatomie*, &c. t. v. p. 110.) A few scattered remarks on the subject may be found in the writings of VAN SWIETEN, J. L. PETIT, LEVACHER, and

others, who have attributed it to rickets and other affections, and have evidently been unacquainted with its nature, causes, effects, and method of treatment. Not a week passes without cases of this contraction being presented at the Infirmary for Children; and although sometimes a congenital deformity, it has appeared to me very frequently to be greatly increased, if not altogether occasioned, subsequently to birth, by the very common practice among nurses of lifting the child by pressing the palms of the hand on the sides of the chest, immediately under the armpits. This deformity consists of a greater or less depression of both sides of the thorax, with a proportionate protuberance of the sternum and abdomen forwards, and of the vertebral column backwards.

2. It is most commonly found in infants born of debilitated, lymphatic, scrofulous, and rickety parents, — particularly those inhabiting low, cold, and moist situations, or who live in small ill-ventilated apartments, — and amongst children who are badly clothed and nourished. In many cases the deformity does not consist of merely a level depression of the lateral parietes; but the ribs are actually bent inwards, the sternum and spine forming a curve outwards. In some, the lower or upper parts of the sternum are the most prominent. This extreme grade of depression is seldom or ever met with at the moment of birth; M. DUVUYRE thinks differently. My experience leads me to state that it generally comes on gradually after birth, owing to deficient inflation and development of the lungs, arising from the weakness of the muscles of inspiration, and flexibility of the ribs at the time of birth. In cases of this description, the vital energy of the lungs is insufficient for their healthy actions, and the respiratory mechanism is unable to accomplish their full expansion, or to sustain the continued pressure of the atmosphere, before which the soft and imperfectly formed thoracic parietes gradually yield. The manner in which nurses frequently lift infants, as already stated, tends further to increase the mischief, particularly in those who are originally weak and ill-nourished. The effects of this contraction of the thorax upon the functions, and ultimately on the structure, of the lungs and heart, soon become very evident. We usually find the pulse quick, and the breathing oppressed; with a weak voice, occasional anxiety, and incapability of speaking or reading for any time, or of uttering many words without frequent pauses. In the newly born infant, there is great difficulty of suckling, from its inability to raise the ribs with sufficient power to perform this process. It is seized with suffocation when at the mother's breast, which it often quits with fits of crying. As it advances in age, the disorder of respiration and circulation is still more remarkable, particularly upon ascending acclivities. The pulse becomes quick, irregular, or intermittent; and is accelerated upon the slightest cause, whether physical or mental.

3. In children whose chest is thus compressed, the tonsils generally, or rather constantly, become tumid, — so much so, as frequently to increase the disorder of the respiratory actions; and all the structures and organs of the body are impaired both in function and in development, owing to the derangement which the depression occasions to respiration and circulation. In many cases which

have come before me, rapid emaciation, great debility, defective assimilation and sanguification, an atrophied and flaccid state of the muscles, softening of the bones, frequently asthenic or chronic bronchitis, and swelling of the glands, have followed the deformity, and terminated the life of the patient.

4. *Organic lesions.* — In these cases the appearances observed on dissection are such as the original and consecutive ailments lead us to expect. These consist in retarded development of the skeleton; want of union between the bones composing the cranium; enlargement of the heads of the long bones, sometimes with softening and flexures of their bodies. Dentition is also retarded; and, if it have proceeded, the crowns of the teeth are eroded. The voluntary muscles are atrophied, soft, pale, and exhibiting a fish-like structure. The lungs are compressed towards the vertebral column, and present a corresponding depression to that of the lateral parietes of the chest, with the marks of the ribs indented in their posterior and lateral surfaces. This organ is often studded with tubercles of various sizes; portions of it are frequently often inflamed or hepatized; and, in some cases, attended with bronchitis, the bronchi are more or less loaded with mucus, or mucopurulent matter. The substance of the heart is commonly pale and flaccid; and, in young infants, the foramen ovale is sometimes widely open; and in older children, but imperfectly closed. The mucous follicles of the intestinal canal are often tumefied, but rarely ulcerated, excepting when a chronic diarrhoea has attended the latter stages of the thoracic compression. The mesenteric glands are also occasionally much enlarged.

5. II. *DEPRESSION OF THE STERNUM, with lateral prominence of the ribs.* — This deformity is the reverse of the former: the sternum is pressed inwards, either at its middle or lower part, or along its whole extent; the ribs are very much bent, and prominent laterally; the chest being broad, but compressed anteriorly, the shoulders high, and the spine either straight or but little altered from its natural form. This change has also been much overlooked by authors. Mr. COULSON, however, has lately noticed it in an instructive article on deformities of the chest. It is by no means uncommon both in young and grown up subjects, although not so frequent as the lateral depression. In cases of depression of the sternum, the lungs and heart are compressed anteriorly; their functions much altered, and ultimately their structures. This deformity is very seldom congenital, being the consequence of weakness, or of a scrofulous or tubercular diathesis. I have met with two instances of it out of six members of one family who died of consumption soon after puberty. It is in some cases antecedent of any apparent disease of the lungs; in other instances, it is consecutive of pulmonary disease; and in others, of external pressure and stooping occupations.

6. It is not uncommon to find females with the chest of a cylindrical or oval form, instead of being a truncated cone; entirely in consequence of the inordinate pressure to which its lower part has been long subjected from tight lacing of the stays. In some of these cases, the sternum, particularly its lower part, is pressed inwards. The effects, however, of this habit, and of the deformities which it occasions, have been alluded to in an-

other part. (See CHEST—*Examination of the*, § 3.)

7. *TREATMENT.*—A. *The cure of the lateral depression of the chest* is by no means so hopeless as it may appear, particularly if it be attempted at an early period, and before serious organic mischief has been produced. Invigorating medicines and nourishing diet are requisite, particularly in conjunction with various external and mechanical means.

8. a. *The external treatment* which I have found the most successful, consists of warm or tepid salt water bathing in infants; and in directing the mother to make pressure very frequently through the day upon the protuberant spine and sternum, by placing one hand on the former and the other on the latter. But this pressure must be so managed as to be made only at the moment of expiration, and entirely suspended during the moment of inspiration, so that no impediment may be in the way of the free dilatation of the parietes of the chest. The practitioner should take care to instruct the mother in the manner of employing the pressure upon the sternum and spine, with the view of throwing outwards the depressed lateral walls of the chest. The more frequently this pressure can be employed, the better; and its benefits will be considerably promoted by applying the following liniment, night and morning, along the spine, or even upon both the sternum and spine. I have employed this and similar liniments, in these situations, with the greatest advantage, in this and several other diseases connected with debility, particularly in young subjects.

No. 110. R. Liniment Camphoræ Comp., Linim. Saponis Comp., aa 3j; Olei Tercebinthinæ 3vj; Benzoini 3ij; Styracis Balsami 3jss; Olei Cajuputæ, Olei Limonis, aa 3ss. M. et fiat Linimentum.

9. In public practice, I have usually substituted for the above, either equal parts of the compound camphor and turpentine liniments; or these, with the addition of the soap liniment, or their equal quantities of olive oil and turpentine, with a little soft soap. In conjunction with these means, the artificial salt water bath, with a very large proportion of salt, at a temperature suited to the peculiarities of the case, will be found extremely serviceable. As soon as children affected by this depression of the walls of the chest can be brought to employ the muscles of the upper part of the body in a determinate manner, this mode of treatment should also be employed. Perhaps the best mode of overcoming the depression, by developing muscular action and power, is to cause the child to raise weights, by means of ropes and pulleys placed at a considerable height over its head; so that, by taking hold of the rope with both hands raised above the head, and pulling it downwards, the muscles may be brought into action, and the parietes of the chest thereby dilated. But moderate and duly regulated exercise, particularly of the muscles of the arm and trunk of the body, accompanied with invigorating medicines and regimen, will be productive of benefit.

10. b. *Internal treatment* should always be conjoined with the means stated above. The digestive functions generally require regulation, and tonic or permanent excitement. After having evacuated morbid secretions and fecal accumulations from the bowels, by means of the usual

purgatives, of which rhubarb, or senna combined with a tonic bitter, is among the most suitable, Brandish's alkaline solution, or the solution of potash, or other preparations of this substance, may be given, either in some gruel or mutton broth, or in a tonic infusion, or combined with the preparations of iron. The following powders may also be taken once, twice, or thrice daily:—

No. 111. R. Ferri Sulphatis exsic. gr. ij.—vj.; Potassæ Sulphatis gr. xij.—xx.; Pulv. Cascariæ 3j.—3jss. Misce bene, et divide in Cartulas xij. æquales, quarum capiat unam bis terve quotidie.

No. 112. R. Potassæ Sub-carbon. gr. j.—iv.; Ferri Sub-carbon. gr. iij.; Pulv. Rhei gr. iv.—ix.; Pulv. Cascariæ (vel Calumbæ) gr. v.—xij. Misce. Fiat Pulvis.

No. 113. R. Ferri Tartarizati gr. iij.—xvj.; Pulv. Calumbæ gr. vj.—xij.; Pulv. Zingib. gr. ij. M. Fiat Pulvis.

11. Instead of these, the tincture of ammoniated iron; mixtures containing sulphate of quinine; or the tincture of iodine, in doses of one to three drops, twice or thrice daily, may be employed advantageously. In every other respect the treatment is the same as that recommended for RICKETS. But whatever mode of cure be adopted, change of air, or at least a wholesome pure air, with regular exercise, is requisite to its success. In this deformity, the various exercises resorted to with the view of imparting strength and agility to the frame, will be useful, if judiciously directed.

12. B. *The treatment of the other deformities of the chest* must be conducted very nearly on the same principles; the pressure, in cases where it may be proper to have recourse to it, being made in an opposite direction to that recommended above, when the anterior parietes are depressed. But this deformity is very seldom met with so early in life as to admit of any expectation of advantage from the use of pressure. The other means, as long as the pathological states of the thoracic viscera do not contra-indicate them, are the most applicable.

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CHICKEN-POX. *SYN.* *Varicella*, *Crystalli*, *Variola Spuria*, *Variola Lymphatica*, *Variola Volatica*, *Auct. Var.* *Variola Pusilla*, *Heberden*. *Erythema Varicella*, *Parr.* *Synochus Varicella*, *Young.* *Emphyliis Varicella*, *Good.* *Verole Volante*, *Fr.* *Die Unsichten Kindspocken*, *Ger.* *Ravaglione*, *Ital.* *Water-jags*, *Water-pox.*

CLASS. 1. Class, 3. Order (Cullen). 3. Class, 3. Order (Good). III. CLASS, III. ORDER (Author).

1. DEFIN. *An eruption over the body, of semi-transparent glabrous vesicles, with red margins, accompanying a slight attack of fever, seldom passing into suppuration; but, on the third day, bursting at their tips, concreting into small puckered scars, and leaving no cicatrices.*

2. Under the name chicken-pox, or *varicella*, have generally been comprised certain eruptions, which closely agree in many features with each other, and which in some respects resemble small-pox. It is from this latter circumstance that they claim a very particular notice, as they are generally of so slight a nature as to require but little medical treatment. They were formerly very generally confounded with small-pox; but the difference between them was remarked as early as the beginning of the sixteenth century by *Vidus Vidius* and *Ingrassias*, *Sennert* and

RIVETI, professors at Wirtemberg and Montpellier at the commencement of the seventeenth century, and DIEMERBROECK, state that the distinction was well known in Germany, France, and Italy, to the vulgar, who had a separate appellation for this eruption. MORTON was the first in this country to mark the difference, and to describe this disease under the name "*chicken-pox*," by which it appears to have been commonly known before he wrote. Since then it has been noticed by FULLER, and accurately defined as a distinct disease by HEBERDEN. He, however, continued to designate it by the term *variola pusilla*; whilst his contemporaries, VOGEL, BURSEIUS, and SAUVAGES, also applied to it the generic term *variola*, with the specific designation of *volatica*, *spuria*, and *lymphatica*. But, as Dr. BATEMAN has remarked, this circumstance never generally been considered evidence of their considering it as generically the same with small-pox. The entirely distinct nature of chicken-pox was very generally believed in, since Dr. HEBERDEN pointed out the difference between it and the small-pox, until recently questioned by Dr. JOHN THOMSON, by whom the opinion of the earlier physicians, that they are merely varieties of the same disease, has been revived. This learned physician, and M. BÉRARD, urge in favour of this opinion the circumstance of variola and varicella appearing from the same exciting causes, whether those affected have been vaccinated or not; and affirm, that persons exposed to the infection of chicken-pox have caught small-pox, and that the former appears only in those whose constitutions have been modified by the influence of either small-pox or cow-pox. On this subject MM. SCHÉDEL and CIZENAVE remark, that in those epidemics which they have had opportunities of noticing in Paris, the several eruptions might be classed under three heads: 1st, Variola properly so called; 2dly, The malady termed varioloïde, or variola modified; 3dly, An eruption purely vesicular, offering every appearance of varicella. The same cause, namely, variolous infection, seemed to develop these several eruptions, which were observed in the same quarters, in the same streets, in the same houses. When the disease made its appearance among a numerous family, some had small-pox, some modified small-pox, and others chicken-pox. One circumstance was striking to every one, namely, the mildness of the disease in those persons who had been vaccinated, and in the majority of those who had already had variola.

3. These facts certainly favour the opinion of Dr. THOMSON; but, as the above writers have stated, many cogent arguments have been urged against it, especially by ANRHOMBI, BRYCE, LUDENS, &c.: — 1st, It is very difficult to determine, during a small-pox epidemic, whether the occurrence of that disease among individuals coming in contact with persons infected with chicken-pox is rather the result of this communication, than of the variolous infection which at that moment develops the malady on all sides: 2d, Vesicular varicella, properly so called, is not transmitted by inoculation, and never produces variola: 3d, Those persons who consider chicken-pox as contagious, have confounded it with modified small-pox: 4th, Varicella appears in persons who have not been vaccinated, and who have

never had the variola; consequently, in such cases, it cannot be regarded as a variola modified by the prior existence, either of this disease or of vaccination: 5th, Vaccination practised shortly after the disappearance of varicella pursues its course in the most regular manner, which never happens when vaccination follows variola: 6th, The progress of varicella is uniformly the same, whether it occurs before or after vaccination, or after variola: 7th, Variola sometimes reigns epidemically, without being accompanied by varicella; and, on the other hand, the latter may become epidemic without being attended by the former. In fact, the characters of the eruption, and the symptoms of varicella, differ essentially from those of variola.

4. 1. DESCRIPTION. — A. Of the eruption. Under the name *chicken-pox* are included different varieties of eruption, generally characterised by very slight and brief antecedent fever, consisting of vesicles or very imperfect pustules which mature and decline in three, four, or five days, occurring chiefly during infancy and childhood, but also at adult age, and occasionally prevailing epidemically. The generic term, *chicken-pox*, comprises three species, or rather varieties, which have been distinguished from each other for very many years in different parts of this country, by the popular names of chicken-pox, swine-pox, and hives. These WILLAN and BATEMAN distinguished, according to the form of their vesicles, into, 1st, *Varicella Lenticiformis*; 2d, *V. Coniformis*; and, 3d, *V. Globularis*. Dr. GOON has adopted these names and distinctions, but has added a fourth, the *V. Corymbosa*, the clustering or confluent chicken-pox; which, if considered at all as a distinct variety, is not of frequent occurrence; but has occasionally been observed by BATEMAN, KING, and myself.

Var. i. LENTICULAR CHICKEN-POX, *Varicella Lenticiformis*; *V. Lymphatica*, Plenck.

5. This variety appears, on the first day of eruption, in the form of small red protuberances, of an irregularly circular, or rather tending to an oblong figure, with a nearly flat and shining surface, in the centre of which a transparent vesicle is very soon formed. On the second day of the eruption the vesicle is filled with a whitish lymph, and is about the tenth of an inch in diameter. On the third day the lymph is straw-coloured; and, on the fourth, the vesicles which have not been broken subside, and are puckered at their margins. Few of them are entire on the fifth day; but the orifices of several which have broken are closed or adhere, so as to confine a little opaque lymph within the puckered margins: on the sixth day, small brown scabs appear in place of the vesicles; and become yellowish on the seventh and eighth days, gradually drying from the circumference to the centre. On the ninth and tenth days they fall off, and leave for a time red marks on the skin, without depression. The disease may, however, be longer than now stated, owing to fresh vesicles appearing during two or three successive days, and going through the same stages as the first. The eruption is usually distinct, is general over the body, and comes out first on the back and breast. The vesicles, even when they suppurate, leave no cicatrices. The pustules of small-pox break out first on the face, neck, and breast, and always leave depressions.

Var. ii. CONOIDAL CHICKEN-POX, Varicella Coniformis; Varicella Verrucosa, Plenck; Variola Lymphatica, Sauvages; Pemphigus Variolodes, Frank; Verolette, Fr.; Ravaglio, Ital.; Swine-pox.

6. The vesicles of this variety arise suddenly, have a somewhat hard and inflamed base, and are on the first day acuminated, containing a transparent lymph. On the second day they are a little more turgid, their bases more inflamed, and the lymph in many of them is of a light straw-colour. On the third day the vesicles are shrivelled, and those which are broken have their lymph concreted into slight gummy scabs. Such of them as remain entire, and have their bases much inflamed, contain, on this day, a whitish puriform fluid; every vesicle of this kind leaving, after scabbing, a durable cicatrix. On the fourth day, thin dark brown scabs are seen intermixed with others, which are rounded, yellowish, and semi-transparent. These scabs gradually dry, separate, and fall off in four or five days.

7. A fresh eruption of vesicles usually takes place on the second or third day, and has a similar course to the preceding; the whole duration of the eruptive stage being thus six days in this variety of varicella. In some instances minute red tubercles appear, and subside without forming vesicles. The scales last formed are generally not not separated till the eleventh or twelfth day. In some cases, when the febrile symptoms have been severe, slight ulceration takes place in the vesicles from which the scabs have fallen off, leaving depressions or cicatrices, but only in parts subjected to pressure.

Var. iii. GLOBULAR CHICKEN-POX, Varicella Globularis; Hives.

8. The vesicles of this variety are large and globular, but their base is not quite circular. They are surrounded by inflammation, and contain a transparent lymph, which is slightly turbid, and resembles milk whey, on the second day of the eruption. On the third day they subside, become shrivelled as in the former varieties, and appear yellowish from the admixture of a small quantity of puriform matter with the lymph; some of them remaining in the same state till the following morning; but before the conclusion of the fourth day, the cuticle separates, and thin dark scabs cover the basis of the vesicles. These scabs dry, and fall off in four or five days afterwards.

9. *B. Of the constitutional affection.*—All these varieties of chicken-pox may attack the same individual at different epochs, and offer the same symptoms, whether before or after small-pox or vaccination. They are frequently associated with the epidemic prevalence of small-pox. They appear principally in the early months of the year, and the spring; seize chiefly young persons, and adults sometimes; and each of them, with few exceptions, affects a person only once in their lives. Varicella is preceded, for twenty-four or forty-eight hours, by chills, depression, anorexia, costiveness, and thirst, with heat of skin, flushed countenance, accelerated pulse, tendency to perspiration, and other febrile symptoms. Sometimes there is nausea, or even vomiting, with pain at the epigastrium and through the limbs. In some cases, the fever is so very slight as to be overlooked; and, in infants, is often indicated only by heat of skin and fretfulness. The

eruption usually commences on the back and breast; appearing next on the face, neck, and scalp; and lastly on the extremities. It is sometimes preceded, for a few hours, by a general erythematous rash; and the vesicles are usually most abundant in the conoidal form; they being sometimes coherent, or seated close together, but seldom confluent. When thus coherent or clustering, they form the fourth variety of Dr. GOOD (§ 4.). Owing to the itching which accompanies them, children often break the vesicles by scratching; whence proceeds an increased inflammation, forming a yellowish pus, more or less consistent. This happens particularly on the face. The crusts which replace these pustules remain much longer, and leave small cicatrices. As the vesicles appear successively during two or three days, we may perceive the eruption exhibiting its several stages at the same period, in the same individual.

10. 11. *DIAGNOSIS.*—The vesicle full of serum on the top of the pock, on the first day of the eruption,—the early abrasion of many of the vesicles,—their irregular and oblong form,—the shrivelled state of those that remain entire on the third and fourth day, and the radiating furrows of others which have had their ruptured apices closed by a slight incrustation,—the general appearance of the small scabs on the fifth day, at which time the small-pox pustules are not at the height of their supuration,—sufficiently distinguish chicken-pox from small-pox. Dr. WILLIAMS has pointed out the characteristic circumstance, that variolous pustules are, on the first and second day, small, hard, globular, red, and painful; imparting the sensation, when the finger is passed over them, similar to that which one might conceive would be excited by the pressure of small round seeds under the cuticle. In varicella, almost every vesicle has, on the first day, a hard inflamed margin; but the sensation communicated to the finger is like that from a round seed flattened by pressure. As the pustules of small-pox, moreover, become gradually developed, they contain a white thick matter; the formation of which precedes supuration, as shown by Dr. ASHBURNER. When the globular vesicles or hives appear, as is sometimes the case, intermixed with the lenticular or conoidal eruption, they afford a ready distinction from the small-pox, to the pustules of which they bear little resemblance.

11. It is not, however, so easy to distinguish varicella from modified small-pox. The symptoms precursory of the latter are usually intense, which is never the case with the former. In modified variola, the eruption is pustulent, and the pustules are small, circular, and generally depressed in the centre. After the scaly crusts drop off, tubercles are frequently seen, which disappear but slowly. In varicella, the vesicles, which are at first transparent, contain a fluid which becomes sero-purulent; and they are never followed by tubercles, as in modified variola. To this I must add, that varicella is not infectious; whereas modified variola may be transmitted by inoculation, and may even, in some cases, occasion a very severe attack of true small-pox.

12. *III. THE TREATMENT* of varicella is very simple: the patient should remain in bed, in a temperate atmosphere; ought to be placed on low diet, and abstain from animal food for a few days;

should have the bowels duly regulated, and partake freely of lukewarm diluents.

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CHLOROSIS. DER. AND SYN. From *χλωρός*, paleness, yellowish green. *Pallidus Morbus*; *Fævus Virginum Color*; *Pallor Vir-ginum*; *Morbis Virgineus*; *Fædi Colores*; *Ic-terus albus*; *Ictericus alba*; *Cachexia Virginum vel Muliebrum*; *Febris Amatoria*; *Chlorosma*, &c. Auct. Var. *Chlorose*; *Pâles Couleurs*, Fr. *Die Bleichsucht*, Ger. *Green Sickness*, Eng.

CLASSIF. 2. Class, Nervous Diseases; 2. Order, From Defect of Vital Energy (Cullen). 5. Class, Diseases of the Sexual Function; 2. Order, Affecting the Or-gasm (Goul). I. CLASS, II. ORDER (Author, in Preface).

1. DEFIN. — *Pale yellowish green complexion, languor, debility; depraved appetite, with occasional nausea or sickness, and disorder of the sexual secretions; generally occurring about puberty, or soon afterwards.*

2. Chlorosis has been very generally con-sidered as a variety merely of amenorrhœa, particularly by CULLEN, PINKET, and FRANK, although they have classed it as a distinct disease. As to its occurrence independently of retained or sup-pressed menstruation, there can be no doubt, although it is frequently connected with such disorder. It is also similarly related to dyspepsia, and to anæmia; Dr. YOUNG classing it with the former disease. SAUVAGES includes, as a variety of chlorosis, the cases of anæmia which occur in infants and children, denominating them the *chlorosis infantum*. But, although several such cases are met with in practice, they seldom pre-sent the yellowish green tinge of this disease, being usually of a white or exsanguineous paleness, un-less when complicated with jaundice, which is but rarely remarked. They are entirely referrible, in respect of their pathological relations and ter-minations, to anæmia (see BLOOD—*Deficiency of*); and are sometimes, owing to the exhaustion at-tendant upon their last stages, mistaken for hydro-cephalus. SYDENHAM considered chlorosis as a variety merely of hysteria, connected with a cacochymia,—its frequent complication with that disease being evidently the source of this fallacy; and, lastly, VAN SWIETEN viewed it as a form of cachexy. These opinions serve to show the propriety of considering it as a distinct disease, but more or less intimately related to those com-plaints, owing to the circumstance of them all originating in a nearly similar state of vital energy, particularly as manifested in the organic nervous system; specific differences between them con-sisting in the particular viscus or part more es-pecially affected, and in the grade and mode of such affection.

3. Dr. Good divides chlorosis into two species,

the atonic and entonic; but this is an unnecessary refinement, no phenomena which warrant such a distinction presenting themselves in practice. Indeed, the entonic only consists of a state re-latively of less deficiency of vital power than the atonic, and is, in many cases, merely the first stage of the disease; particularly when it occurs in tolerably strong females, and whilst the torpid function has not as yet extended much further than the sexual organs, in which it originated, the digestive, assimilating, and vascular organs not having sustained much disorder. Dr. GOOD has likewise made mention of an acute chlorosis, occurring chiefly in married women. But the state of disease thus designated by this physician, is simply that chronic disorder, often attended with slight irritative fever, following large losses of blood, which are not readily supplied by the digestive and assimilating functions; and is in all respects a state of anæmia. (See BLOOD, § 34, et seq.)

4. I. CAUSES. — A. *Predisposing causes.* Chlo-rosis is most frequent in girls about the age of puberty; either previously to the appearance of the menses, or when they are retained, or occur irregularly, or with difficulty. But married wo-men, particularly widows and those who have not borne children, are not exempt. It is even met with in males, although rarely, about the period of puberty; as remarked by HAMILTON, BLANE, DESORMEAUX, ROCHE, and myself in two or three cases. When observed in this sex, it is apparently connected with protracted evolution of the sexual organs; and one or two of the young females of the same family are sometimes also affected. The lymphatic and melancholic temperaments; feeble and delicate constitutions; residence in cold, moist, and miasmal localities and climates; insufficient, unwholesome, innu-tritious, and watery vegetable food; inattention to the digestive functions, particularly those of the bowels; the abuse of diluents, of acid weak wines, or of spirituous liquors, early in life; too great indulgence in warm bathing; pro-longed sleep; tight lacing at an early age; and whatever debilitates and relaxes the system; pre-dispose to this disease. The most frequent causes in this country are sedentary occupations in crowded and ill-ventilated manufactories and towns, especially those employments which re-quire a stooping position, and are prosecuted by females at a very early age, or before the frame is developed.

5. B. The more common exciting causes, are longings after objects of desire; depressing pas-sions and affections, especially unrequited love, or unfortunate or imprudent attachments; long entertained feelings of sadness or anxiety, particu-larly when caused by removal from friends, and the scenes of recent happiness and affection. According to M. DESORMEAUX and ROCHE, privation of the physical gratification of love is a very frequent cause. Retention, difficult and imperfect occurrence of the menses, have very generally been enumerated amongst its causes; but the uterine disorder is rather a coincident effect of the same pathological state that produces chlorosis (§ 12.). Suppression of the menses, ex-cessive menstruation, and manustupration, are sometimes concerned in its appearance; the latter acting chiefly by debilitating the frame generally, by exhausting the energy of the sexual organs, and

thereby assisting the operation of other causes, particularly when the functions of the stomach and bowels are torpid, or otherwise disordered. The influence of constipation, and fecal collections in the cæcum and colon, in occasioning the disease, cannot be questioned, although somewhat exclusively insisted upon by Dr. HAMILTON, in opposition to the opinion of Dr. CULLEN, who referred it chiefly to an inactive state of the ovaria. It seems, however, quite as evident that the torpor of the digestive organs, especially of the lower bowels, and the inactivity of the uterine organs, depend upon the state of the organic system of nerves, which supply not only those viscera, but also those concerned in assimilation and circulation, — all those functions presenting more or less disorder in the course of the disease.

6. II. HISTORY AND SYMPTOMS. — Chlorosis presents two stages; the *incipient*, and the fully developed or *confirmed*. It also manifests various morbid associations or *complications*. A. The *incipient* stage commences insidiously, and almost insensibly. The patient is at first languid, listless, weak; loses her complexion; has no disposition to amusement, if it require mental or physical exertion; is often without appetite, or craves for particular, and sometimes unwholesome, kinds of food; the bowels are costive; bodily exertion soon occasions shortness of breath, and fatigue; the breath is offensive; the tongue is white or pasty; sleep is disturbed or unrefreshing, and oppressive in the morning; she often complains of intermittent headache, pain of the left side, and palpitations, which are induced by the slightest cause; the pulse is quick, weak, and small; and the catamenia are either retained, or are scanty, and of a pale colour: all these symptoms gradually increase, and the countenance becomes more and more pale, and assumes a greenish yellow tint.

7. B. The *fully developed* disease presents its characteristic complexion — the pale greenish yellow of an etiolated plant. The lips, gums, insides of the cheeks, are pale; the eyelids are livid, sometimes oedematous, particularly in the morning; the conjunctivæ are remarkably white; the soft solids flaccid; the extremities cold; and the ankles oedematous. The tongue is usually pale, soft, flabby, and indented at the edges by the teeth; sometimes it is smooth, glossy, and fissured. The appetite is more and more capricious and morbid; sometimes with pica, or a desire for pickles and acids; and nausea and vomiting, especially in the morning, and cardialgia or gastrodynia after meals, not infrequently occur. If the menses have already appeared, they become gradually more difficult, and scanty; are attended with syncope or pain; are of short continuance, pale, or watery; recur at longer periods, and at last disappear. The patient is often sad; enters into depressing and sinister ideas; prefers solitude, and is capricious. In the more advanced or inveterate cases, the finger nails are brittle, dry, and split or break off; the hair is weak, falls out, is lank, dry, and splits at its extremities. The abdomen is often tense, distended, and slightly painful. A constant pain is complained of under the left breast, sometimes with a slight cough; the constipation alternates with diarrhoea; some degree of emaciation takes place; the oedema extends, or assumes the form of anasarca or

ascites; various irregular states of hysteria occasionally appear during the course of the disease; and some one or two symptoms become prominent, occasionally deceiving both the patient and medical attendant by their severity. Thus the headache, pain of the side, palpitations, cough, &c. occasionally lead to the apprehension of inflammatory states of the brain, or of the pleura, of disease of the heart, or of phthisis.

8. C. *Terminations and complications*. — When the disease becomes inveterate from neglect, inefficient treatment, or the continued operation of its causes, &c., it often assumes diversified forms, owing to morbid associations. The continued disorder and debility of the digestive organs, and the consequent insufficient supply of healthy chyle to the blood, as well as the imperfect sanguification of what is supplied to it, sooner or later gives rise to anæmia, which, in its slighter grades, owing to the causes hereafter to be noticed (§ 12.), even accompanies the early stage of chlorosis. In females who have been married, or in those who, previously to the appearance of the disease, had the uterine functions and discharges regularly and fully established: hysteria, in some one or more of its numerous states, is commonly observed. Chlorosis is sometimes also complicated with swellings of the glands, or with chronic cutaneous eruptions, or with hæmatemesis and melæna; and occasionally terminates in dropsy of either the thoracic or abdominal cavities. Mania and delirium rarely ensue in the course of its advanced stages and inveterate forms.

9. III. DIAGNOSIS. — Chlorosis is most intimately related, in its symptoms, and the nature of the changes which constitute it, to anæmia. Indeed, the advanced stage of the former is often identical with the latter; the chief differences consisting in the pale, greenish, or greenish yellow tint of the countenance, the torpor or disorder of the uterine functions, and affection of the stomach in chlorosis. It also often resembles other chronic diseases, particularly those seated in the stomach, and tuberculous affections; but not so closely as to be mistaken for them. Neither the nervous headache, nor the hysterical pains, particularly those complained of in the left side and under the left breast, nor the palpitations of the heart, can with due attention be confounded with inflammation or organic change in these situations: yet have I seen these mistakes made, and nearly fatal consequences ensue, — the practitioner having been deceived by the frequency of the pulse in such cases. In this, as well as in other diseases, much advantage will accrue from recollecting that the most acute pain is generally owing to a pathological state the reverse of inflammatory; and that the most frequent pulse is very far from indicating a necessity for blood-letting, which, if practised in such cases, will increase the morbid sensibility and the vascular irritability, even when it does not hasten a fatal termination.

10. IV. PROGNOSIS. — Chlorosis is always chronic; is generally cured, particularly in its simple form; but sometimes also terminates fatally, owing to the associated lesion of various functions and organs. Recovery may be confidently expected, when it is incipient or uncomplicated, and none of the internal viscera betray marked disease; especially if it have not continued longer

than two or three months, and the menses have not appeared. If it occur in married women, sterility is often the consequence; or, if children are borne, they are generally feeble and unhealthy. Chlorosis should be viewed in a serious light, if it have been of long duration; if the catamenia, after having appeared, are gradually suppressed; more particularly if the signs of anæmia to a considerable degree be present; if emaciation be rapid, with quick respiration and cough; if the œdema of the extremities extend; if symptoms of effusion of serum into the cavities supervene; if hæmatemesis or malæna occur; and if it have resisted, in its early stage, a judicious treatment. In the advanced progress of the disease, especially when it is complicated, death sometimes takes place unexpectedly, but seldom without evidence of excessive depression of the organic nervous influence, and of great deficiency of the circulating fluid. (See BROWN, § 42. *et seq.*)

11. V. PATHOLOGY. — A. Morbid appearances. The adipose substance is sometimes not much diminished; but the rest of the soft solids is flaccid and pale, from a deficiency of the red blood. Effusion of serous fluid is commonly met with in the large cavities, particularly those of the pleura, pericardium, and peritoneum, and occasionally also in the ventricles of the brain. The lungs are frequently œdematous, or studded with tubercles; the liver is often enlarged, and sometimes pale or tuberculated; the stomach small, pale, and contracted; the mesenteric glands slightly enlarged; the ovaria and uterus, in some instances, are imperfectly developed, or contain small tumours; the cavities of the heart are occasionally somewhat enlarged, and their parietes are generally flaccid and pale, or slightly atrophied; the blood is commonly pale, aqueous, and deficient in coagula, — those which are found in the large veins and auricles of the heart being of a very light colour, and small. These are the most common lesions; but others are sometimes noticed, both in the organs now mentioned, and in different parts, as in the spleen, pancreas, gall-bladder, kidneys, &c. In some cases but little change beyond the exsanguineous state of the various structures are observed, as in those recorded by LIEUTAUD.

12. B. Nature of the disease. — It has been considered by many writers, and amongst others by WEDEL, KORTE, CULLEN, DRSORMEAUX, and ROCHE, that chlorosis is chiefly dependent upon debility or torpor of the nervous influence developing and actuating the ovaria and uterus. HOFFMANN, DARWIN, and SAUNDERS connect it more immediately with obstructed function of the liver. HAMILTON refers it chiefly to torpor of, with accumulated sordes in, the digestive organs, particularly the lower bowels; and ANDRAT, to the deficient and morbid state of the blood. If we reflect upon the character of the associated phenomena constituting the disease, in relation to their causes on the one hand, and to their consequences and terminations on the other, we must necessarily arrive at the inference, that all the organic functions — those of digestion, assimilation, sanguification, nutrition, and generation, — are inadequately performed; and, as the organs devoted to these offices are intimately connected one with the other, and actuated by the organic nervous system, that consequently the vital energy

of this system is insufficient for the purposes it is destined to perform. We know that the evolution of the sexual organs is owing to the state of vital power; and that, by a reciprocal influence, the activity of those organs increases all the other functions of the frame. Therefore, as we commonly observe this disease at the period of puberty, and associated with imperfectly developed or performed function of the sexual organs, we must necessarily infer, that the defective energy of the organic nervous system delays or arrests their development, and weakens their functions; the whole frame being thereby deprived of the stimulus they impart to it. Consequently, if the causes continue to operate, or if this system experience no salutary or natural excitement, all the organic functions languish more and more; the chyle is imperfectly prepared; and sanguification and assimilation are inadequately performed; all the phenomena of an advanced state of the disease being the result.

13. VI. TREATMENT. — A. In its first stage, this affection is generally soon removed, 1st, by a due attention to the causes, — particularly the mental or moral causes, — and by removing or counteracting them as far as possible; 2d, by evacuating all morbid and accumulated sordes from the alimentary mucous surfaces, and regulating the alvine secretions and excretions; and, 3d, by imparting vigour to the digestive and organic functions, and exciting at the same time the torpid or imperfect actions and secretions of the uterus. It will generally be necessary to ascertain the causes of the affection, or to direct the attention of the friends of the patient to their nature, tendencies, and the best means of counteracting them. The medical treatment may be commenced with a moderate dose of calomel or pill, and a few grains of powdered ginger, given at bed-time; and the following morning the secretions should be more fully promoted and evacuated by a dose of castor oil, or of the compound decoction of aloes. After the bowels have been freely evacuated, the following pills, or Form. No. 877, should be taken daily, either during or after dinner: —

No. 115. R. Albes Socot, Ferri Sulphatis, ʒi gr. ij.; Gum. Mastich. gr. j.; Pulv. Capsici gr. ij.; Syrup. Simp. vel Olei Caryoph. q. s. M. Fiant Pululæ duæ.

During the use of these, it will generally be requisite to promote the functions of the liver, and excite the bowels, by the occasional repetition of the calomel and ginger at bed-time, and the purgative draught the following morning. In some cases, the operation of the medicine may be very advantageously promoted by an enema. In many instances, nothing beyond what is now recommended will be necessary; but, in addition, a course of chalybeate mineral waters may be directed; and, under every circumstance, exercise in the open air, particularly on horseback, change of air to the sea coast, a light nutritious diet, and warm clothing, especially of the lower extremities, should be recommended. Flannel drawers will be found of service in winter.

14. B. In its second stage, or in the more obstinate cases, or when the affection is attended with difficult or scanty menstruation, the tinct. ferri ammoniati, or the tinctura guaiaci ammoniati, and the phosphate of iron, are preferable to the sulphate of iron, — the compound aloetic de-

coction being the most suitable aperient. When pains of the head, or of the left side, or other symptoms of hysteria, or palpitations, are complained of, these medicines will be advantageously associated with camphor and hyoscyamus. When the torpor of the uterine system is evident, conium will, however, be preferable in such cases to hyoscyamus, and may be given either with these medicines, or with any of the ammoniated spirits. In a few obstinate cases of the disease, I have prescribed, with marked advantage, small doses of the extract of *nux vomica*, and the *strychnine*, as in Formulæ 542. 565. and 907.

15. If the disease still persist, if the ankles swell, or if dropsical symptoms come on, and the menstrual evacuations continue suppressed, advantage will sometimes accrue from rubbing the loins assiduously every night with either of the liniments, Form. No. 296. and 311., and acting gently on the bowels by means of the following pills:—

No. 116. R. Pilul. Aloës cum Myrrha ʒj.; Saponis Castil. ʒ ss.; Olei Crotonis Tiglii ℥ij. Contunde bene simul, et divide in Pilulas xxiv., quarum omni nocte capiat unam, binas, vel tres.

16. In the course of practice, I have seen three cases of the disease complicated with swelling of the parotid and submaxillary glands. In order to remove these tumours, I prescribed *iodine* internally, in small and frequent doses, giving also at bed-time the aloes and myrrh pill. In these instances, the menses gradually came on, and all disorder vanished. I have on other occasions observed a very marked emmenagogue, as well as tonic effect, produced by the preparations of iodine; and from these effects, as well as from their efficacy in the above cases, I consider them calculated to prove of use in certain states of obstinate chlorosis. On some occasions, particularly when chronic eruptions appear in the course of the disease, sulphur will be found the best aperient, and the following pills will be productive of benefit; but, in addition to those already particularised, several recipes will be found in the Appendix suited to the different forms and complications of this affection, as well as of other derangements of the uterine functions.

No. 117. R. Sodæ Sub boracis ʒij.; Sulphur. Præcip. ʒj.; Mucilag. Acaciæ q. s. Fiant Pilulæ xxiv., quarum capiat tres ter quotidie (See also F. 519.)

No. 118. R. Sub-boracis ʒij.; Pulv. Capsici Annui ʒj.; Pilul. Aloës cum Myrrha ʒj.; Olei Sabinæ q. s. M. Fiant Pilulæ xxx., quarum capiat binas ter die.

No. 119. R. Ferri Sub-carbon. ʒj.; Sulphur. Depur. ʒj.; Myrrhæ Aloës Soc., Fellis Taur. Insp. aa ʒss. Contunde bene simul, et divide in Pil. gr. iv., quarum sumat binas vel tres bis terve in die. (Recommended by Richter.)

17. Electricity and galvanism have been advised by RENAUD and SIGAUD LA FOND for this disease; and the ammoniated copper, by BIANCHI. The preparations of iron have very properly been directed, in conjunction with the alkalies and myrrh, by WILLAN, with stimulants and bitters, by SCHNEFFER, with assafœtida, by HIRSCHEL, and with cinchona and rhubarb, by RANOE. Marriage has been suggested as a remedy for chlorosis, by WEDDEL, LE BLANC, KORTE, and several others. Cold bathing has been recommended by BRANDIS, and condemned by DARWIN; and purgatives have been chiefly depended upon by HAMILTON. The use of mineral waters is certainly of much service in chlorotic cases. Those of Driburg, Pymont, Spa, Carlsbad, &c. on the

Continent, have been much praised by BRANDIS, MARCARD, and KAFFSIG; and the chalybeate springs in this country, by most practitioners. But equal advantage will sometimes accrue, in the inveterate forms of the disease, from the sulphureous and saline waters, in addition to a judicious course of medicine; and from the Bath and Buxton warm springs, used in the form of baths. The warm hip-bath, some salt and a little mustard having been added to the water, is also beneficial. (See MENSTRUATION.)

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CHOLERA. SYN. Cholera Morbus, Passio Cholericæ, Diarrhæa Cholericæ, Auct. Lat. Choléræe, Cholerragie, Trousse-gulant, Fr. Die Gallenruhr, Brechruhr, Ger. Diarrhæa Cholera, Young.

CLASSIF. 2. Class, Nervous Diseases; 3. Order, Spasmodic Affections (*Cullen*).

1. Class, Diseases of the Digestive Functions; 1. Order, Affecting the Alimentary Canal (*Good*). II. CLASS, III. ORDER (*Author*, in Preface).

1. DEFIN. Gripping pains, followed by vomiting and purging, very rarely with flatulent eructations and defections, and always with spasms of the extremities, particularly the inferior, and an anxiety.

2. I. HISTORY AND SYMPTOMS.—The term CHOLERA has been in use since the time of HIPPOCRATES, who admitted two species of the disease,—one humid, the other dry,—*choléra hygrè*, *choléra xèrè*. According to CLEUS, it is derived from *cholè*, and *rho*, signifying literally bile-flux. TRALLIAN, however, derives it from *cholàs* and *rho*, intestinal flux. GALEN, adopting the distinction established by HIPPOCRATES, attributed the humid cholera to the presence of acrid humours generated by the corruption of the food; and the dry cholera, to an acrid flatus. With very slight modifications, this doctrine was received by FERNEL, BAILLOU, SYDENHAM, F. HOFFMANN, HANCU, SAUVAGES, and VOGEL, the difference chiefly consisting in the part they ascribed to the bile, and to the state of this secretion, in the production of the disease. CULLEN directed attention, more accurately than his predecessors, to its nervous and spasmodic characters. PINEL was, however, the first who made any considerable innovation on the opinion of the Ancients as to its nature. He classed it as a species of the genus of fevers, to which he applied the term of *Meningo-gastric*. M. GEOFFROY (*Dict. des Scien. Méd.* t. v.) subsequently attributed to it an inflammatory character; and MM. BROUSSAIS and GRAVEN afterwards contended that it consists of inflammation of the mucous surface of the digestive tube commencing with nervous symptoms.

3. This diversity of opinions will be fully accounted for in the sequel; but I may at present remark, that they may be in many respects reconciled, inasmuch as the particular form of disorder, for which each exclusively contends, frequently exists as a part of the morbid condition constituting the disease. After having paid considerable attention to the literature of cholera, and had much experience of all its forms — of two of them in my own person — I consider that it admits of division into the following distinct varieties:— 1st, *The Cholera Biliosa*, or bilious cholera; 2d, *Cholera Flatulenta*, flatulent cholera; 3d, *Cholera Spasmodica*, the spasmodic cholera, or *Mort de Chin*. As I believe the disease which has appeared in recent times, and has received numerous appellations, among which that of *epidemic cholera* has been most commonly used, to be a different malady from the other forms of cholera, I have treated of it in a distinct article. (See PESTILENCE.)

i. *CHOLERA BILIOSA*, *Bilious Cholera*; *χολέρα* *ὕγρη*, Gr.; *Cholera Humida*, Lat.; *Choléracie*, Fr.; *Die Gallenruhr*, Ger.

4. *DEFIN.* *Copious and frequent vomiting and purging, at first of the alimentary and fecal matters, with a redundancy of bile, and spasms of the legs and thighs.*

5. *Causes, States, &c.*—This is the most common variety, and presents itself *sporadically, endemically*, and in an *epidemic* form. When it appears *sporadically*, it is often slight, and of short duration; but it is also sometimes extremely severe, according to the state of the patient, and nature of the exciting causes. In this form, it is not infrequently met with during summer and autumn, and but very rarely in spring. It generally attacks persons whose bowels and secreting viscera have either been, for some time previously, in an inactive state, or become loaded by an accumulation of retained, and thereby altered secretions, particularly bile; and arises from exposure to the sun's rays, or to a high degree of temperature, and afterwards to cold, or cold combined with moisture, particularly when applied to the extremities; from sudden atmospheric vicissitudes, particularly cold easterly or northerly winds after hot weather; from cold miasmal night air, and dews, after a warm sun; cold drinks when the body is overheated, and the incautious use of ices; from cold, indigestible, or unripe fruits, particularly melons, cucumbers, pine-apples, and poisonous or irritating ingesta of any kind; the excessive use of spirituous or malt liquors, and ingurgitation; from large doses of cathartic or emetic drugs (HARR, *Diss. de Chol. Morbo*. Hal. 1740.); fright, particularly from thunder (*Phil. Trans.* 1667.); and from whatever occasions a sudden depression of the vital energies of the frame, and irruption of accumulated bile into the duodenum.

6. The intimate relation existing between this species of cholera, and the *colica cibaria* or surfeit, in respect of their causes, and several of their symptoms, did not escape the notice of SYDENHAM. Dr. Goon has also remarked the similarity. But the distinctions are nevertheless sufficiently marked, and more numerous than those writers have assigned. The spasms of the extremities in the latter; the retraction of the testes, the copious vomitings and alvine evacuations, with redundancy of bile, particularly after the vomiting and

purging have continued for some time, and the more acute character of the disease, are sufficient to mark the wide difference between them.

7. In the *endemic* form, cholera is seldom presented to the observation of practitioners in northern countries. To certain districts in some southerly climates, particularly between the tropics, bilious cholera may be said, from the frequency of its occurrence, to be strictly endemic, although in a less marked degree than certain forms of fever, or dysentery, or even hepatitis. According to my own observation, and that of several friends whose range of experience has been great, bilious cholera is very prevalent in situations which are subject to emanations from decayed vegetable matter, or putrid matter of any description; particularly from swamps, moist grounds, the banks of rivers, lakes, or canals, &c., and from foul drains or cesspools, during warm seasons, or wide and rapid changes of temperature; or when the thermometer rises high during the day, and sinks low towards the night and morning.

8. Bilious cholera assumes the *epidemic* form, sometimes in warm climates, and not infrequently also in temperate countries. In the latter, this form of the disease manifests itself only in the months of July, August, and September,—the number of cases increasing from June to September, when they are usually most numerous, and diminishing rapidly in October. The epidemic bilious cholera is generally most remarkable during very warm summers and autumns occurring after a very rainy winter and spring, or after a succession of wet seasons; and when the days have been warm, bright, and sunny, and the nights comparatively cold or chilly, with heavy dews. Owing to this state of season, the atmosphere is humid, and loaded with the miasms of decayed vegetable and animal matter; and, owing to this cause, together with the high range of temperature, the bile is secreted in greater abundance than usual, and is more liable to become acrid or otherwise altered (see LIVER—*Disordered Function of the*); and the cool nights, particularly if the air be much loaded with exhalations set free from the soil by the rays of a scorching sun, tend to check the cutaneous exhalations, and determine the chief current of circulation and secretion to the abdominal viscera. The use of fruit, which is usually abundant at these seasons, also augments the frequency of the disease, by promoting the operation of the other causes. It increases the acidity of the prima via, as contended for by BERTRAND and LINNÆUS, renders the contents of the bowels, and the secretions poured into them, of a more irritating quality to the nerves of the stomach and intestinal canal, and thereby often promotes the irruption of acrid bile, which had been long pent up in the gall-bladder and hepatic ducts, and which is a great cause of irritation when it is suddenly poured into the duodenum.

9. During states of temperature and of season which favour the extrication of exhalations from the soil, the epidemic visitations of this variety of cholera are more severe. In many cases, occurring at these periods, the disease can scarcely be imputed to the state of the biliary secretion merely, but rather to the internal congestions occasioned by its exciting causes, giving rise to

spasmodic contractions of the alimentary canal, to vomiting and purging, and to spasms of the voluntary muscles, &c.; the bile accumulated in the gall-bladder and hepatic ducts being let loose and thrown into the intestines only subsequently to the seizure, and owing to the vomitings and purgings which usher it in. In some cases, indeed, this irruption of bile is prevented from taking place, until an advanced stage, by spasm of the common duct, extended to it from the duodenum, as more commonly occurs in the third variety of the disorder. When the various causes now referred to combine to produce the disease, particularly in persons of a nervous and irritable temperament, and who have neglected, for a considerable time before, the state of the bowels, and secretions poured into them, it cannot be a matter of surprise, that its symptoms assume the severe form described by SYDENHAM.

10. *Symptoms.* — Bilious cholera, in whatever state it occurs, differs chiefly in its degree of severity. It is chiefly characterised by anxiety, and by painful and violent gripings, evidently proceeding from spasmodic contractions of the alimentary canal, taking the duodenum for their point of departure, and occasioning the continued or frequently repeated rejection of their contents by vomiting and purging. Owing to the anatomical connection of the great sympathetic or ganglial system with the voluntary nerves and other parts of the frame, the spasms extend to the abdominal muscles, and muscles of the lower extremities, — the testes being forcibly retracted to the abdominal ring, — and are accompanied with great pain. The tongue is dry or clammy; thirst is very urgent, and the urine scanty and high coloured. The pulse is at first full and frequent; but, as the disease continues, it becomes smaller, weaker, and more rapid. At more advanced periods, the spasms sometimes extend to the arms and hands. The symptoms often continue with little variation for some hours; but, when the attack is severe, seldom without the patient's strength being greatly reduced; the countenance at last becoming anxious and collapsed; the breathing frequent, interrupted, and laborious, and sometimes with singultus; the pulse feeble, irregular, and intermittent; and the extremities cold or clammy, with leipthymia or fainting.

11. *Duration and Prognosis.* — The cholera of temperate climates is seldom fatal, unless when it is more than usually prevalent, after very rainy and hot seasons. But, when neglected or improperly treated, especially at such times, a fatal issue may occur, but very rarely in less time than twenty-four hours. In milder cases, it may extend to two or three days, and then terminate either favourably or unfavourably, most commonly the former; the vomiting, purging, and spasms subsiding, and entirely ceasing, the pulse becoming slower and fuller, and the countenance resuming its former expression. An unfavourable issue is indicated by a continuance of the purging and vomiting, particularly after substances are taken into the stomach, a hurried, gasping respiration; great frequency, feebleness, irregularity, and intermissions of the pulse; collapse and paleness of the countenance; coldness and pulselessness of the extremities, with anxiety, and frequent faintings, &c. In general, however, even when left to itself, the disease operates

its own cure in the course of some hours; or it continues for one, two, or in milder cases for even three days, and ceases by degrees; the morbid secretions which excited the attack having been evacuated, and the irritation they occasioned having subsided. Although nature may accomplish this without aid, yet the assistance of art is generally required to ensure its attainment. The febrile symptoms attending the early stage of the disease, unless in some instances of its epidemic prevalence, are merely the consequence of the pain, spasms, vomitings, and general commotion of the nervous system, and usually subside immediately these disorders are allayed.

ii. CHOLERA FLATULENTA, *Flatulent Cholera*; *χολέρα ἐρηρά*, Gr.; *Ch. Sicca*, Lat.

12. *DEVIN.* Vomiting and purging rare, sometimes retchings; gripings and spasms of the abdominal muscles, with great and oppressive flatulence, temporarily relieved by eructations, andjections of flatus.

13. This variety was formed by HIPPOCRATES, continued by SYDENHAM, and, after having been discontinued by the majority of modern writers who, if they at all remarked it, considered it rather as a form of colic than of cholera, was again distinguished as a species of this latter disease by DR. GOOD. It is very rarely met with in practice; and generally holds an intermediate rank between flatulent colic and cholera, sometimes approaching more nearly to the former. In none of the very few cases of this description which have come before me (not exceeding two or three), have I observed a natural secretion of bile; but, on the contrary, the liver has evinced signs of great torpor, and the whole digestive organs have been manifestly enfeebled, long protracted dyspepsia and hypochondriasis having existed previous to the attack.

14. This form of the disease is chiefly characterised by spasms of the alimentary canal, apparently excited by acrid, rancid, and indigestible substances; and by an irritating gas either secreted from the digestive mucous surface, or generated from the decomposition of the imperfectly digested food. (See articles *COLIC* and *FLATULENCY*.) The painful and flatulent griping is accompanied with severe spasm of the abdominal muscles, anxiety, occasional retchings, flatulent irritations, and calls to stool, with slight tenesmus, and very scanty, offensive, pale coloured, and watery evacuations, with flatus. Considerable depression of the powers of life, acceleration of pulse, pale, anxious countenance, coldness of the extremities, and sometimes alarming sinking, supervene, when the disease has been neglected.

15. *Causes.* — This rare form of cholera chiefly appears in the debilitated, and those of a melancholic temperament; and is generally excited by a surfeit, by cold drinks when the body is overheated, by the use of cold or unripe fruits, particularly melons, water-melons, cucumbers, unripe plums, mushrooms, and animal poisons, especially the rank parts of bacon, or tongues, sausages, &c. when kept too long, or insufficiently cured; also by unhealthy or stale fish, and by cold or moisture after having been exposed for some time previously to a high range of temperature. The author was very recently the subject of an attack as described above, from having partaken of

tongue kept too long after having been imperfectly cured. In this case the affection was much more nearly allied to cholera than to colic; and this he is the better enabled to state, from the circumstance of having been the subject of the other varieties of the former disease at different periods of his life.

iii. CHOLERA SPASMODICA, *Spasmodic Cholera*; *Mort de Chien*, Fr.

16. DEFIN. *Vomiting and purging of watery matters, without any appearance of bile; spasms violent, and extending generally through the frame; speedily followed by sinking of the powers of life.*

17. This variety of cholera may be said to be endemic in some intertropical countries, particularly in the eastern hemisphere, where it has occasionally assumed also an epidemic form, nearly approaching the remarkably fatal *pestilential cholera*, which appeared in Bengal in 1817, and which has subsequently spread over all Asia, Europe, and part of Africa. (See PESTILENCE.) It has been very imperfectly noticed by BONTIUS, CURTIS, PAISLEY, SONNFRAT, and GIRDIFSTONE; but its nature and treatment were very imperfectly known, until Dr. JOHNSON described its symptoms, and pointed out a more successful method of cure than had previously been employed. Several of the cases of cholera, which SYDENHAM has described as epidemic in 1669, seem to have been of the variety now under consideration.

18. CAUSE, symptoms, &c.—This form of cholera proceeds from exposure to cold, or to a cold, raw, and moist atmosphere, or to the night air loaded with terrestrial emanations after the prevalence of warm weather, or exposure to a hot sun; or, in a word, it generally results from a more intense grade of the same causes, particularly the exhalations from the soil, that produce the bilious cholera. It commonly commences with chilliness, sometimes amounting to a rigor or shiver; soon followed by gripings, and frequent purging of a watery, slimy, or sero-mucous matter, which is sometimes thrown off with great force. To these succeed nausea and retchings, with the ejection of a watery fluid; anxiety at the epigastrium; spasms of a violent, painful, and tonic character, attacking the muscles of the abdomen, thighs, legs, thorax, and, lastly, the arms and hands; a small, quick, and contracted pulse; great thirst, and immediate rejection of whatever is taken into the stomach. As the disease proceeds, the pulse becomes weaker and smaller; the spasms more general; the purging constant and painful, generally with tenesmus; the vomitings are renewed, upon the ingestion of substances into the stomach; and the powers of life rapidly fail. During this time, the fluids evacuated from the stomach and bowels present no appearance of bile, although occasionally bile is seen in the evacuations to a small extent. In the course of a few hours, the features shrink, the hands and feet become cold and clammy, the exacerbation of the spasms force out a cold clammy sweat on the face and breast; the pulse is extremely small and weak, or nearly disappears;—in a case which came before me in Africa, in 1816, the pulse could scarcely be felt four hours from the attack;—the spasms assume more of the clonic character; and the contents of the stomach are now, in the more dangerous cases,

sometimes thrown off, without any effort or retching. Commonly, during all this time, fecal matters, and the biliary secretions are retained, apparently owing to the extension of the spasm from the duodenum to the common biliary duct, and to spastic constrictions of parts of the colon; the epigastrium and hypochondria being sore, tense, and tumid. When the disease is treated with decision, the vomitings cease; free evacuations, with a discharge of bile, take place; and the patient soon recovers. But if neglected, or improperly managed, the powers of life fail very rapidly; the eyes sink, and are surrounded with a livid circle; the countenance assumes a remarkably anxious cast, or is pale, wan, and shrunk; and the spasms extend to the very fingers. The breathing now becomes extremely laborious; the patient is restless; and at last is carried off, sometimes in the space of ten or twelve hours.

19. Such is the progress of spasmodic cholera, as it was observed by the writer in the years 1816 and 1817, in an intertropical climate, and as he then experienced it in his own person. About the same time other cases of a milder form occurred, and presented the characters described as constituting the bilious variety of the disease, with which the writer had also been formerly attacked in this country, in the end of September, 1815,—a season of unusual warmth,—when he was attended by his friend Mr. QUEAENE. There can be no doubt that the first and third varieties of cholera chiefly differ in degree, and in the circumstance of the latter arising, in most cases, from the operation of causes of a more intense grade than those which induce the former. But as additional phenomena are developed in the latter variety, and other symptoms assume a different or modified character, and especially as a distinct method of cure is requisite to its removal, the propriety of distinguishing it as a separate form of the disease is manifest.

20. II. DIAGNOSIS.—This disease can be mistaken only for the pestilential cholera, or for poisoning by acrid substances. The diagnosis between this and the pestilential malady is fully pointed out in that article. It is often difficult to distinguish between the different varieties of true cholera (the pestilential disease which has been very generally viewed as a form of cholera being, in my opinion, very different in all its relations from this), and the disorder occasioned by irritating poisons. Dr. CHRISTISON, in his very able work on Poisons (p. 93.), has assigned the more rapid termination of poisoning, in fatal cases, as a ground of distinction. But he supposes that death from cholera occurs at a later period than it usually does: and, hence, this source of diagnosis cannot be much relied upon. Death from irritating poisons usually takes place within thirty-six hours, and sometimes within twelve hours; being seldom delayed beyond sixty hours; but the fatal issue in cholera is very rare, he considers, in less than three days. I believe, however, that, although death from the common cholera of this climate is rare, it more frequently occurs from twenty-four hours to eight and forty, than at a later period. Greater dependence is to be placed upon the appearance of the matters vomited, which are more frequently sanguinolent after irritating poisons than in cholera. But the

chief diagnostic sign is the sense of heat, acridity, or burning in the throat, descending in the course of the oesophagus to the stomach, which is so much complained of in poisoning, and precedes the vomiting. In cholera, when a similar sensation is felt, it is usually confined to the region of the stomach, and is consequent upon the vomiting.

21. The diagnosis between cholera and other diseases which resemble it the nearest is easy. It is distinguished from *colic*, by the frequency of the vomiting and purging, the spasms of the muscles of the extremities, and the greater acceleration of pulse;—from *diarrhœa*, by the vomiting and the spasms; and by the quickness of the pulse in the latter stage of cholera;—from *dysentery*, by the tenesmus, bloody stools, absence of the spasms of the extremities, and of the vomiting; or the occasional presence merely of this last symptom in that disease;—from *ileus*, by the appearance of the matters vomited, and the obstruction of the bowels constituting that malady;—and from *painters' colic*, by the absence, or occasional occurrence only, of vomiting; by the constipation, the paralytic signs, &c. characterising that disorder; and by the history of the case.

22. III. CAUSES AND PATHOLOGICAL STATES.

The remote causes have been already noticed in connection with the symptoms and forms of the disease they occasion. A. As to the *morbid appearances*, they may be stated as generally being very slight in rapidly fatal cases, and consisting merely of irritation of the mucous surface of the duodenum, stomach, and small intestines; but without any change of structure. If death takes place at a more or less remote period, injection of the capillaries, with congestion, sometimes with ecchymosis, and enlargement of the mucous follicles, is observed more or less extensively—either in streaks or patches—in the inner surface of the digestive tube. In fatal cases of the third variety of the disease, the liver has been found congested, the gall-bladder and hepatic ducts filled with dark coloured inspissated bile, and the common ducts sometimes constricted or obstructed.

23. B. The *pathological state* constituting the disease, seems to consist of irritation of the mucous surface of the digestive tube, commencing in the duodenum, and extending in each direction—to the stomach, small intestines, and along the common duct, to the gall-bladder and liver,—with increased action of the muscular coats of these viscera, and determination of the circulating fluid to them. This irritation or morbid excitement, owing to the connections of the organic nerves supplying these parts, is propagated to the spinal nerves, by which the muscles of the abdomen and extremities are affected by painful and violent contractions; and it is chiefly owing to the exhaustion of the vital manifestations of the organic system of nerves, and to the frequent and profuse discharges, that a fatal issue takes place: the circulating organs, which are actuated by this system, being, in consequence, incapable any longer of performing their functions.

24. A question may arise as to whether the disease commences with the irritation of the mucous surface of the duodenum and adjoining portions of the digestive tube, or with determination of the circulation to the liver and adjoining vis-

cera, and an irruption of bile, which has become more than usually irritating, owing to its retention in the biliary apparatus, or to its formation from redundant or noxious materials accumulated in the circulating fluid (see BLOOD, § 119. and 120.), during high ranges of temperature, and moist miasmal states of the air. It is not very material which of these phenomena is the first to occur: probably either may precede the other; and even, in some cases, that both may be nearly coetaneous. It is, however, most likely that the procession of morbid phenomena described above (§ 22.) obtains in the great majority of cases.

25. C. The different states of cholera may terminate differently from either of the ways already noticed (§ 10. 14. 18.): it may pass into inflammation of the stomach or of the intestines, or of both; it may also lapse into dysentery, or into a regular attack of gastric, bilious, remittent, or intermittent fever. The superposition of some of these diseases upon, or their association with, cholera, has been long since noticed by MORTON and TORTI; and, more recently, by JACKSON, J. P. FRANK, and SCHMIDTMANN; and must be familiar to experienced practitioners, particularly in warm, moist, or miasmal climates. In many such instances, this mode of termination is to be imputed to the nature of the exciting causes, the constitution of the patient, and sometimes also to the premature arrest of the evacuations by opium, and the neglect, subsequently, of procuring the discharge of morbid secretions by purgatives, &c.

26. IV. TREATMENT.—Demulcents, diluents, and weak broths or soups, have been very generally given at the commencement of a choleric attack, particularly of its first or common form, since the time they were recommended by SYDENHAM. In slight cases, and at its beginning merely, this is as judicious treatment as can be adopted. But in the more severe seizures, and particularly if a delay of two or three hours has taken place in applying for or procuring medical aid, much more decided means should be resorted to. In such cases, it is no longer necessary to promote the evacuation of the offending matters, which have generally by this time been expelled. It is preferable, therefore, in these, and, indeed, under most circumstances—1st, To allay the irritable state of the stomach, the spasms, and other urgent symptoms of the disease; 2d, To remove, by appropriate means, as blue pill, diluents, mucilaginous fluids, and deobstruct aperients and enemata, whatever morbid secretions may be retained or re-accumulated; 3d, To prevent the occurrence of inflammation of the digestive mucous surface, by sheathing the surface of the bowels from the irritating action of the morbid and accumulated secretions during their discharge; 4th, To support the powers of life when they appear to sink; and, 5th, To restore and promote the functions of the various emunctories.

27. A. *Opium*, generally in the form of pill, is the medicine most to be depended on for the accomplishment of the first intention, especially in mild cases of the first variety. From one to three grains of it may be taken at once; but, in more severe attacks, and in the second and third varieties, it is preferable at first to combine it with from ten to twenty grains of calomel, which, in

a large dose, is one of the most quickly efficacious means we possess of diminishing vascular irritation of the internal surface of the stomach and small intestines. When a large dose of these remedies has been given, a repetition may not even be required; but, in the severe states of the disease, it will be necessary to repeat it once or even twice, after an interval of from three to six hours, or even longer, according to the urgency of the case. If the attack require the exhibition of two or three such doses of calomel, little apprehension of its affecting the mouth should be entertained, as such a state of disease admits not of the retention of the whole of it; and, when it is necessary thus to repeat it, the biliary organs will derive benefit from it. If the first doses of opium and calomel be not retained, they should be immediately repeated. In plethoric or robust subjects, when the pulse is fully developed, and the spasms severe, especially in the third variety of the disorder, a full or moderate bleeding may be directed; but it should be performed early, and restricted to young or robust subjects. This practice was employed by Dr. J. JOHNSON in India; and subsequently adopted by numerous other practitioners, as well as by myself. I should, however, state, that I have prescribed it only for Europeans who had recently arrived in a warm climate; but natives, or acclimated Europeans, require a different treatment (§ 30, 31, and 32.). In slighter cases opium, if not too early exhibited, will be sufficient to cure the disease; and the instances must be few, in which its use, in some form or other, can be dispensed with. Its superiority to other medicines in cholera has been admitted by LINNÆUS (*Morbi Naut. Ind. Ups. 1768.*), THOMANN (*Annalen ad 1800.*), YOUNG (*On Opium*, &c. p. 36.), QUARIN (*Animadversiones Pract.* pp. 204–207.), and by most recent writers. RIND (*View of Dis. of the Army*, p. 63.) advises it to be given in copious draughts of tepid diluents; PERCIVAL (*Essays*, vol. ii. p. 405.), in enemata; and SYDENHAM (*Opera*, p. 177. ed. Lug. Bat.), after diluents and demulcents had been freely given, and the offending matters removed. When, however, vomiting and purging have existed some time, more particularly in severe cases, opium ought to be immediately exhibited; but in order to secure the effect of it, or of calomel combined with it, the patient should now refrain from diluents, in order that the rejection of the medicines may not be risked by them; and should merely rinse his mouth frequently with some cooling beverage, swallowing only minute portions of it, at short intervals. SYDENHAM has very justly remarked,—and the importance of the observation has been acknowledged by FRANK and SCHMIDTMANN,—that when opium is given too early, much disorder of the bowels and abdominal organs, with more or less fever, continues afterwards to be complained of; evidently owing to the arrest of a salutary effort, and the retention of morbid secretions. But the second intention of cure (§ 26.), and the combination of calomel with the opium, have for their objects to prevent this result in cases where all the morbid secretions may not have been expelled before the opium has been administered.

28. It is not unusual to find, upon being called to a case of the disease, that aperients had been freely exhibited with the view of promoting the

evacuation of the offending secretions. But this is a hazardous practice, and is often, as SYDENHAM has remarked respecting it, adding fuel to the fire: its propriety at a later period, when the vomiting and spasms have disappeared, will be admitted.

29. If the spasms, pain at the epigastrium, and internal heat, be severe, very warm fomentations, or the hot bath at about 100° or 102°, are of much service if used early in the attack. But neither these, nor blisters, nor sinapisms, are so instantly and perfectly remedial as the turpentine fomentation applied over the abdomen. (See *Art. Cæcum*, § 32.). Several authors have recommended the use of cold or iced fluids, with the view of allaying the heat complained of in the stomach. They deserve notice chiefly from being recommended by ARETÆUS (*Curat. Acut. Morb.* l. ii. ch. iv.), CÆLIUS AURELIANUS (p. 258.), LIENARD (*Ergo Cholera Morbo Frigidus Potus*, Paris, 1626.), HOFFMANN (*De Cholera*, obs. v. Opp. iii. p. 173.), CLEGGHORN (*Diseases of Minorca*, p. 222.), PENADA (*Osservazioni*, &c., Weigel Ital. Bibl. b. iv. st. 1. p. 134.), and PANZANI (*Beschr. der Krank. von Istrien*, &c.). BARTHOLINUS (*De Usu Nivis Med.* p. 141.) advises the application of ice over the epigastrium; and BURNSTIEL, cold vinegar to the same region. The nitric acid drink has been much employed in India in cases of cholera. A favourable account of it in this disease was published by Sir J. MACCRICKON, in *DUNCAN'S Annals* for 1802. And Mr. HOPE has recently recommended it conjoined with opium, in the cholera of temperate climates.

30. When the severity or duration of the more urgent symptoms has occasioned feebleness of pulse, with cold skin, and other symptoms of exhaustion, restorative means are requisite. Ammonia, camphor, the aethers, brandy, Cayenne pepper, the various aromatics and spices, are now the most serviceable medicines, and should be given frequently, and in moderate doses, variously combined, and generally with small quantities of opium. Although at an earlier stage it was necessary to prescribe opium in a large dose, yet at this period very small quantities only ought to be given, particularly if exhibited frequently. Any of the following will be now of advantage:—

No. 120. R. Aq. Anethi 3j; Magnes. Carbon. ʒj; Spirit. Ammon. Arom. ℥j; Pulv. Capsici gr. iij; Tinct. Opi Comp. (F. 728) ℥x; Confect. Arom. gr. viij. M. Fiat Haustus, secundis horis capiendus.
No. 121. R. Aq. Menth. Virid. 3x; Ammon. Carbon. gr. v; Magnes. Calcinat. 3 ss; Tinct. Capsici An. ℥j; Spirit. Pimentæ 3j; Tinct. Opi Comp. ℥xij; Olei Cinnam. ℥j. M. Fiat Haustus.
No. 122. R. Infus. Caryoph. 3x; Magn. Calc. ʒj; Tinct. Cardamom. Comp. 3j; Tinct. Opi Camphor. (F. 728) 3j; Syrup. Zingiberis 3j. M. Fiat Haustus.

31. In this stage of the disease, the application of sinapisms or blisters to the epigastrium, as directed by CÆLUS (l. iv. ch. xi.), MORELLI (*Nuovo Giornale di Milano*, 1792.), and AASKOW (*Acta Reg. Soc. Méd. Hann.* i. p. 154.); of stimulating and irritating frictions of the surface, as advised by ARETÆUS (*Cur. Acut. Morb.* l. ii. ch. iv.), CÆLIUS AURELIANUS (p. 257.), and ALEXANDER TRALLAS (l. v. ch. vi.), and of warm analeptic and aromatic epithems and embrocations, as prescribed by MORTON and QUARIN (*Animad. Pract.* p. 206.), may be resorted to. In the third variety of cholera,—which differs

from the first chiefly as to severity and the more prolonged obstruction to the flow of bile in its early stages, or throughout its course in fatal cases;—in addition to the means already stated (§ 30.), the external measures now mentioned may be employed; but they are much less efficacious than the embrocation noticed above (§ 29.). One of our principal objects in this state of the disease is to procure a discharge of bile into the intestines. Large doses of calomel, with opium and camphor, are the internal remedies most to be depended upon for the attaining of this end. But, if the energies of the frame begin to sink before it be obtained, it will be necessary to have recourse to diffusive stimulants in order to counteract the depression: at this period the calomel either may be left off, if a sufficient quantity has been taken, or may be combined with full doses of ammonia or camphor; the stimulants already prescribed (§ 30.), or warm brandy and water, being also given at short intervals, or in larger quantities. The second variety requires the measures now stated, with the addition of purgative and emollient enemata. If the flatulence be urgent, F. 135. 150. will be productive of immediate relief.

32. The natives of warm climates, or Europeans acclimated in them, require from the beginning, that the calomel should be combined as now advised; and that aromatics, antispasmodics, and anodynes, be given early in the disease. The large quantities of hot spices usually employed by these classes of persons, as well as the nature of the attack resulting from the constitution, natural and acquired, of those affected, render it necessary to prescribe aromatics and hot spices, especially Cayenne pepper, in large proportions, in conjunction with opium, camphor, &c. and to have recourse to the external means already noticed, almost from the commencement of the attack. Afterwards when urgent disorder has subsided, calomel, or blue pill, with aromatics, followed by warm stomachic aperients, and by purgative and antispasmodic enemata, will be required.

33. B. Having relieved the more urgent symptoms, whether of violent irritation or of consequent exhaustion, and having allowed some time to elapse in order that the viscera may recover their functions, it will be necessary to promote the discharge of the secretions which may have accumulated during the calm which had been procured, particularly when the inordinate action is followed by complete torpor of the bowels. In cases where calomel had been freely exhibited, mild stomachic aperients will be all that is necessary; but they should be given with caution, and at a time when there appears no risk of re-exciting the choleric attack, which may be readily done by the too early exhibition of purgatives. It will therefore, at first, be better to trust chiefly to enemata; to prescribe the mildest aperients only, and when they are absolutely required; and to administer chiefly mucilaginous fluids, &c. If calomel have not been previously given, a moderate dose, either of it or blue pill, at bed-time, will be even now necessary; and the latter may be repeated every third night, an aperient draught, or a dose of castor oil, being taken on the mornings following, for some time subsequently, until the alvine functions assume a healthy state. But

if the stomach still remain irritable, it will be preferable to prescribe merely a blue pill, or the hydr. cum creta, at bed-time, and employ enemata.

34. C. If, during the progress of disease, or when the urgent symptoms have somewhat subsided, the pulse continues frequent, sharp, or constricted, with tenderness at the epigastrium, a furred tongue, great thirst, nausea, and retchings upon substances being swallowed, and general uneasiness, we should conclude that inflammation of the stomach and upper part of the intestinal tube has come on. In this case, from twelve to twenty-four leeches should be placed upon the epigastrium, and afterwards a succession of warm poultices, the last of which should be followed by the terebinthinate fomentation already noticed. In some cases, it will be necessary, from the severity of this consecutive disease, and the patient's habit of body, to bleed from the arm, previously to applying leeches. In cases where the fomentation is not employed, sinapisms or blisters may be directed, but not until depletion has been carried as far as may be considered either necessary or judicious; and small doses either of hydrarg. cum creta, with magnesia or sub-carbon. of soda, may be given every four or five hours; or of nitrate of potash, and almond emulsion, or any other demulcent substance, with the frequent use of enemata. The termination of cholera in gastric, bilious, remittent, and intermittent fever, or in dysentery, and the circumstances to which I have imputed this occurrence (§ 18, 25.) ought not to be overlooked, but should influence our practice both at the commencement and during the course of the attack. When it has passed into these diseases, it must necessarily be treated according to the new form it has assumed.

35. An attack of cholera soon occasions great exhaustion; and sometimes so great sinking, that even fatal syncope has occurred from allowing the patient to remain too long on the night-chair, or suddenly to assume the erect posture. In severe cases, the patient must be kept in a horizontal position; and besides the medical treatment already prescribed in this state of the disease, mild demulcent soups, beef tea, chicken broth, jellies, and sago or arrow-root, with wine, may be given him. In cases of this description, the exhibition of aperients by the mouth must not be ventured on during convalescence, at least not for several days; and even then with circumspection, and in conjunction with stimulants or tonics. We must endeavour to regulate the secretions by gentle alteratives, and to procure their discharge by enemata. During convalescence from cholera, strict attention should be paid to the state of the digestive functions. The patient ought to abstain from all irritating and indigestible kinds of food, and heating liquors, and from overloading the stomach. Change of air, gentle travelling, and moderate exercise, are extremely conducive to perfect recovery.

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CHOLERIC FEVER OF INFANTS. *Cholera of Children, Cholera Infantum*, Rush and Dewees. — CLASSIF. III. CLASS, I. ORDER (Author).

1. DEFIN. *Vomiting and purging, with fever generally of a remittent type, irregular spasmodic convulsions, and rapid emaciation, attacking in infants and children.*

2. I. HISTORY, &c. — This disease attacks children during the summer and autumnal months, and sometimes as early as April and May. It occurs at any period, from the age of two or three weeks to that of several years. After this age, the same causes which produce it occasion, according to their combinations and the state of predisposition of the patient, either fever of some kind, or cholera, or inflammation of the stomach and bowels.

3. A. CAUSES. — It is often independent of any disorder from dentition, as shown by the age at which it frequently occurs, and the seasons to which it is almost entirely limited. That it is not always caused by acid, acrid, or stale fruit, and indigestible substances, has been proved by examination of the history of numerous cases although, doubtless, this cause, as well as dentition, will contribute to its occurrence. It is certainly not owing to worms, as far as my own observation may be depended upon; besides, it is often met with at an age anterior to that at which worms form in the intestinal canal; and, in fatal cases, worms are not more frequently expelled from the bowels than in many other diseases, as remarked by Dr. RUSH. But it is evidently owing to the influence of high ranges of atmospheric temperature acting upon malarious localities, and upon close, low, thickly inhabited, and imperfectly cleansed and ventilated streets, closes, and lanes, assisted by the above causes, particularly by premature weaning, want of the mother's milk, errors in diet and clothing, &c. That it originates chiefly in an atmosphere loaded with putrid or mephitic effluvia is shown by its occurrence among children thus circumstanced; by its frequency during the seasons already specified in temperate climates, particularly in localities which possess the materials or sources of such exhalations; by the periods of its prevalence among children in warm climates, and in America; and by its appearance at the same time with the cholera of adults, and with remittent and intermittent fevers. This origin is further shown by the circumstance of its being generally accompanied with fever, frequently of a remittent type. In some very unhealthy climates within the tropics, the children born of European parents seldom reach two or three years without having an attack; and, in some places, scarcely one will survive this age, if allowed to remain in them, — this disease cutting them off before they reach a year or two, and often when they are only two or three weeks old. According to Dr. DEWEES, it is

one of the most fatal diseases of children in the large towns of the United States; and it is certainly not an infrequent malady of the same class of patients in this metropolis.

4. B. SYMPTOMS. — The choleric fever of infants sometimes begins with diarrhoea; but more commonly with violent vomiting and purging, which are soon followed by fever. The matters vomited are usually yellowish or greenish yellow; and the dejections are slimy, watery, sometimes offensive, with a sour or putrid odour, and tinged with blood. The natural faeces are generally retained, although small lumps are occasionally passed. In some cases, at an advanced stage, they consist nearly altogether of water, or of substances recently taken. The muscles are irregularly and spasmodically convulsed or contracted; the child is much pained, is restless, and throws the head backwards and forwards, the lower limbs being forcibly drawn upwards. Thirst is intense and unquenchable, cold fluids being eagerly desired. The pulse is small, quick, and feeble. Determination to the brain is soon sympathetically excited, as evinced by increased temperature of the head, and a tendency to stupor. The extremities are commonly colder than usual; and the abdomen is hot. All the febrile symptoms are exacerbated in the evening, and occasionally attended by delirium during the night. The eyes are languid and hollow, are half-closed during sleep; the countenance soon becomes contracted and collapsed, and the cutaneous surface insensible. In the most acute cases, death may occur in twenty-four hours; but the disease is most frequently of considerable duration, presenting occasional remissions. Its violence is much lessened by cool dry states of the air, and increased by a close moist atmosphere. In some cases the vomitings soon abate, and it seems to pass into dysentery, or chronic diarrhoea, either with or without tenesmus, tormina, and occasionally with prolapsus ani. It often runs on several weeks with temporary exacerbations and remissions; occasioning remarkable emaciation, and, lastly, flatulent distension of the abdomen, and aphthæ on the tongue, lips, &c.

5. C. The PROGNOSIS will depend upon the effect of the remedies employed, particularly on the state of the discharges. If these become more abundant, of a darker colour, and more bilious; and if the irritability of the stomach, the cerebral disturbance, and the fever, subside; we may expect a favourable issue. On the contrary, increase of restlessness, of the spasms or convulsive movements, and of the cerebral symptoms, rapid emaciation, small thready pulse, cold damp surface, watery pink-coloured stools, constant puking, and especially flatulent distension of the abdomen, and the appearance of aphthæ about the mouth, continued stupor, with the eyes half open, and occasional convulsions, are very unfavourable signs. A favourable issue should not be expected with any confidence until healthy bile appears in the stools, and the evacuations assume a natural character.

6. D. In fatal cases, the digestive mucous membrane is commonly found more or less inflamed, thickened, softened, its submucous surface infiltrated, and rarely ulcerated or exoriated. The mucous follicles, especially those of the small and large intestines, are enlarged or ulcerated;

the mesenteric glands are often enlarged; the liver is sometimes darker, and generally much larger, than natural; the gall-bladder is occasionally filled with bile; and the spleen is manifestly congested. In a few instances, the intestines have been found more remarkably inflamed, and adherent by means of exudations of lymph on their peritoneal surfaces. In the more protracted cases, effusions of serum are found within the cranium; but, in recent cases, the brain presents little or no morbid appearances beyond slight congestion.

7. *E. Its nature.*—The symptoms, and the appearances after death, clearly show that this disease consists of inflammatory irritation, often rapidly passing into inflammation of the greater part of the mucous surface of the stomach, and of the small and large intestines; frequently accompanied with depressed vital energy of the frame, congestion of the liver, and a morbid state of the abdominal secretions, and occasioning sympathetic disorder either of the functions or of the substance of the brain and its membranes.

8. II. TREATMENT.—At the commencement of the disease, demulcents may be administered. Dr. RYAN recommends an ipecacuanha emetic; but Dr. DEWEES disapproves of emetics, — an opinion which is agreeable to my experience. I have usually first had recourse, in the slighter cases, either to hydrag. cum creta or calomel, in frequent doses, and combined with magnesia or soda; or to nitrate of potash with the sub-carbonate of soda, in demulcents; and to the application of leeches on the epigastrium, whenever tenderness of this region could be detected. After a few of these powders have been taken, a dose of calomel, sometimes with a grain of James's powder, has been given at bed-time, and castor oil the following morning: at the same time, oleaginous glysters have been administered, and, as the symptoms abated, those of an emollient kind employed. If the patient be not very young, a few drops of tinct. opii, or a little syrup of poppies, may generally be added to the injection. The warm bath, or the semicupium, should never be omitted in the treatment of this disease, the surface being well rubbed with a coarse towel upon coming out of the bath, and the child afterwards placed in warm blankets. These means, if early resorted to, will generally succeed in the less severe cases occurring in temperate climates. But, in the more intense states of the malady, medicines given by the mouth will not be retained; and such a dose of opium as will not be rejected, may be injurious. In these, it will be preferable to commence with the application of leeches to the epigastrium; and to endeavour to procure more healthy evacuations, and a discharge of bile downwards, by repeated injections, consisting of a solution of common salt (about two or three tea-spoonfuls) in warm water. The frequency of the stools ought not to prevent the administration of the injection; which will generally relieve the vomiting and other symptoms as soon as bilious or fecal evacuations are procured.

9. When the disease appears to be brought on by improper ingesta, the vomiting may be promoted by diluents. But the object should be to quiet the stomach as soon as possible. For this purpose Dr. DEWEES recommends, for very young children, as well as for those who are older, a tea-spoonful of strong coffee, without sugar or milk,

every fifteen minutes. Of this treatment I have had no experience. In cases where the more bulky medicines are not retained, the plan of giving minute doses of calomel, adopted by Dr. DEWEES, may be followed. He directs a quarter of a grain of calomel intimately mixed with half a grain or a grain of sugar, to be placed dry, every hour, upon the child's tongue, until the stools become more copious, less frequent, and of a dark green colour. When this change is effected, the powders are to be given less frequently. After the bowels have been well evacuated, he prescribes an injection in the evening, with a few drops of laudanum, according to the age of the child; and if the disorder is not much abated, he recommends with the calomel powders as above, on the following morning, repeating the injection at night. I have never tried this practice, having found the means recommended in the preceding paragraph (§ 8.), with those about to be noticed, generally successful.

10. In the more acute cases, especially when fever is early developed, and much heat of the abdomen or of the head is complained of, the disease should be viewed as being entirely dependent upon inflammation of the mucous surface of the digestive tube, and affecting the brain sympathetically. In these, leeches must be placed upon the epigastrium, or behind the ears; if applied to the former situation, a succession of warm poultices should follow them, a full dose of calomel, intimately mixed with a little sugar, be exhibited, and, soon afterwards, an oleaginous injection (olive oil or castor oil, or both, in gruel, strained mutton broth, or any other demulcent vehicle) thrown up. If these measures fail of producing the advantage expected, the back, loins, or insides of the thighs, should be rubbed twice or thrice daily with either of the *liniments* F. 296, 300, 311., particularly upon coming out of the warm-bath, or semicupium, which ought to be employed once or twice daily, and rendered more efficient by adding salt or mustard, or both, to it. The application of blisters for two, three, or four hours, and re-application of them for an equally short time in another place, may be subsequently had recourse to, when the preceding measures do not answer the purpose for which they were directed. In the more severe cases, particularly when the motions are bloody, a mucilaginous draught, with castor oil and two or three drops of laudanum, may be given; and, if it be not retained, an enema, consisting of the same ingredients, may be administered, or any of the enemata contained in the Appendix suited to the circumstances of the case, and proportioned to the age of the patient.

11. In the advanced stage of the disease, especially when it passes into a dysenteric state, and when the exhaustion is great, and the stools are offensive, small doses of the chlorate of lime, or of potash, in an aromatic water, or in mucilaginous draughts or injections, will be very serviceable. In this chronic period, when the disorder lapses into the form of diarrhœa, proceeding from chronic inflammation of the intestinal mucous surface, the following powders may be given alternately with the chlorates, or either before or after they have been tried:—

No. 123. R Hydrag. cum Creta gr. j.; Magn. Ustæ gr. ij.; Gum. Acacim et Sacch. Albi, ʒss gr. v.; Tinct.

Opii Comp. ℥j—℥j. *Fiat Pulvis*, quovis in vehiculo idoneo sumendus, bis terve in die.

No. 124. *R. Sodæ Sub-carbon.* gr. iv.; *Pulv. Acaciæ* gr. xj.; *Aquæ Cinnam.* 3vj.; *Syrup. Papaveris* 3 ss. *M. Fiat Haustus.*

12. It will often be of the utmost service, even at this advanced stage, to give a full dose of calomel, and, if there still be fever, a grain of James's powder, at bed-time; from half a drachm to a drachm of the spirits of turpentine occasionally, with an equal quantity of castor oil being taken on the following morning in some aromatic water, or in milk: or, from five to twenty-five drops of the spirits may be prescribed three or four times daily in any suitable vehicle. During this period of the complaint, small quantities of rhubarb, magnesia, and ginger; lime-water with milk, the preparations of columba with soda, those of catechu with chalk, the hydrarg. cum creta with Dover's powder, the decoction of pomegranate bark, or small doses of the sulphates of iron and of potash, may severally be employed according to circumstances. If pain be still complained of, small doses of the compound tincture of opium, or of Dover's powder, or of syrup of poppies, become absolutely necessary. In this chronic state of the disease, the sub-borate of soda given internally, either alone, or with an equal quantity of supertartrate of potash, has proved extremely useful in my practice at the Childrens' Infirmary; either of the liniments, No. 298. 300. 311., being rubbed daily over the abdomen, and a flannel roller afterwards placed around it. In this stage of disorder, Dr. CHARMAN recommends the following:—

No. 125. *R. Ferri Sulphatis* gr. ij.; *Acidi Sulphur.* gr. x.; *Sacchar. Albi* 3j.; *Aq. Fontau.* 3j. *M. Capiat* 3j. ter quaterve quotidie.

13. The febrile nature of the disease, and its evident connection with inflammation of the mucous surface of the stomach and bowels ought not to be overlooked. In its early stage, therefore, cooling febrifuge medicine and beverages may be allowed the child, in order to assuage the thirst. With this view the liquor ammon. acet. with nitre, and spirit. æther. nit., may be given, with aq. fœniculi, at short intervals; and, in the more advanced stage, when the irritability of the stomach has subsided, small doses of the sulphate of quinine, either in syrup or in compound infusion of roses; or the infusion of cinchona, with a few drops of liquor potassæ, or of the sub-carbonate, may be directed. When the stomach will retain it, this infusion, with liquor ammon. acet., very small quantities of nitrate of potash, and the spirit. æther. nit., has proved beneficial.

14. *Regimenal and Prophylactic Treatment.*—a. When the disease occurs, as is most commonly the case, in infants under a twelvemonth, the diet should consist, at the commencement of the attack, exclusively of the mother's milk, or when it has been recently weaned, a healthy wet-nurse should be procured. If, however, the child will not take the breast, small quantities of diluted sweetened milk may be given, or thin rice or barley-water, with some gum added to it. Besides these, soda water, marsh-mallow tea, and the water poured off an infusion of toasted oatmeal, or oat-cakes, may be also tried. In the latter stages of the complaint, the usual farinaceous aliments may be allowed. Dr. RUSS attributes much importance to the moderate use of salted provisions at this period, and of port wine; and I

have had occasion to know, that both of these are often extremely beneficial when properly restricted. I believe that the want of a sufficient quantity of salt in the food of children, in climates and states of the air requiring this condiment, is often concerned in the causation of the disease. For no malady is change of air more necessary than for this. The child should be removed from the crowded town to the open country; an elevated, dry, but not bleak, situation being selected. Removal to the sea-side is also very beneficial; or, when a more complete change cannot be enjoyed, a close, low situation may be exchanged, even for a time, for one that is more open and elevated.

15. b. The prophylactic measures may be briefly stated to consist of allowing the infant a healthy breast of milk till it is a year old; of wearing flannel next the skin, and keeping the lower extremities warm; of regulating the diet, and avoiding excess in fruit, and the use of unripe, over-ripe, or stale fruit; and of attending to the state of the gums during the period of dentition.

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CHOREA. SYN. *Choreæ Sancti Viti* (from *xopæ* a dance with singing); *Saltus Viti*, *Chorea Sti. Modesti*, *Choreomania*, *Ballismus*, *Orchestromania*, *Epilepsia Saltatoria*, Auct. Var. *Chorée*, Fr. *Der St. Veitstanz*, Ger.

CLASSIF. 2. Class, Nervous Diseases; 3. Order, Spasmodic Disorders (Cullen). 4. Class, Nervous Affections; 3. Order, Affecting the Muscles (Good). II. CLASS, III. ORDER (Author, in Preface).

1. DEFIN. Tremulous, irregular, involuntary, and ludicrous motions of the muscles of voluntary motion, more marked on one side than the other, without pain, occurring in both sexes, more frequently in the female, and chiefly between eight and fifteen years of age.

2. This disease was formerly called the Dance of St. Guy by the French, and of St. Weit by the Germans, from the circumstance of it being so prevalent in Swabia, and other parts of Germany, during the fifteenth and sixteenth centuries, that patients crowded to a chapel near Ulm, dedicated to this saint, who had, by the aid of the priests, obtained great celebrity in its cure. It appears to have been known to the ancients; for the Scelotyrbe of GALEN very nearly resembles it. The earliest writers, since the revival of letters, who noticed this affection are, PLATER, HORSTIUS, and SENNET, under the name of *Chorea Sti. Viti*. In 1560, BAIRD, physician to the Duke of Savoy, mentioned it under the name of "*Indispaitio Saltuosa Membrorum*." But SYDENHAM was the first author who accurately described it. •

3. I. HISTORY, &c. A. Symptoms.—The pathognomonic characters of chorea consist in disordered movements of parts actuated by the voluntary order of nerves; the functions of volition and of muscular action being deranged analogously to the manifestations of the mind in mental alienation. The disordered movements vary very considerably, in respect of the number of parts affected, and of the intensity of the affection: hence it may be

partial or general, slight or severe. It is more frequently partial than general, and is very often confined to the muscles of one side of the body. The description by SYDENHAM has been copied with little alteration by many authors; and, although extremely accurate in respect of some states of the disease, it by no means embraces all the varieties: that by Dr. HAMILTON is, upon the whole, the best, particularly as respects its fully developed form.

4. This affection is often preceded by more or less marked disorder of the organic functions: the appetite is variable, the digestion imperfect, the bowels costive, the abdomen tumid, and the vivacity and physical activity diminished. To these are frequently added timidity, fretfulness, desire of solitude, sighing, palpitations, concealed mental affection, &c. These symptoms of disordered health are followed by slight, irregular, and involuntary twitchings of the muscles, particularly those of the face. These motions increase, assume the form of irregular clonic and continued convulsions, and are often attended by increased hardness, or tumefaction, of the lower regions of the abdomen, and constipation. Owing to the irregular convulsive motions of the face, jaw, head, and neck, of the trunk and extremities, and from the circumstance of these motions taking place at different times, the patient has a jumping, starting, or palsied walk, and cannot perform the usual occupations of the extremities with the steadiness and regularity of health. The characteristic motions vary in degree; but they are always present during the continuance of the disease, excepting while the patient is asleep, when, in most instances, they altogether cease.

5. Different muscles are sometimes successively affected; but those first convulsed still continue so until the termination of the disease. When the affection is fully formed, articulation is impeded, but seldom completely suspended. Deglutition is oftendifficult; the eyes lose their lustre and expression; the countenance becomes pale, languid, vacant, and, in the severest and most protracted cases, conveys the idea of imbecility, or even of fatuity. In the course of disorder, the muscles seem much more soft and flaccid than natural, and emaciation takes place: vertigo and headache are often complained of. The pulse is a little accelerated; the bowels are always constipated, and the urine is usually pale and copious. The tongue and gums are pale; the former being occasionally protruded, irregularly and spasmodically. In some of the severest cases the mouth is variously twisted, and a drivelling of saliva takes place from it: the eyes are distorted, or rolled in various directions, and the sight is occasionally defective. The disposition and temper are unstable or irritable; the mind is often harassed by various concealed mental impressions and ideas; and the emotions or desires are variously excited, without any sufficient or apparent cause. In some cases, deglutition is much impeded, and fluids are forcibly thrown up from the pharynx in attempts at swallowing them. BERST and FRANK state, that the urine and fæces are occasionally passed involuntarily during the height of an attack; but this rarely occurs in simple chorea. There is seldom any pain complained of, and, although the movements cease during sleep, yet the rest is often disturbed.

6. Such is the state of the fully formed disease; but it presents endless varieties, sometimes insensibly lapsing into hysteria, in other cases approaching to paralysis; now scarcely to be distinguished from convulsions; in one instance resembling tarantulum, and in another being closely allied to paralysis tremens. In some cases, the muscles of the face and neck are more affected than those of other parts; whilst in others, those either of the upper or of the lower extremities, or of one limb only, are most convulsed.

7. *B. Duration, complications, and terminations.*

—*a.* The duration of this affection under treatment is various— from two or three weeks to several months: the most common duration being from one to two months. The shortest period of treatment, in the cases which have occurred to me, was eleven days. Relapses are, however, not infrequent. I have seen the affection to return thrice in the same patient. *b.* Choreia is very frequently associated with other disorders: in females with chlorosis, retention or suppression of the menses, anæmia, hysteria; and, in males, with rheumatism, with paralysis, disease of the head, and dropsical effusions in the serous cavities. *c.* It also not infrequently terminates in these, and in convulsions, epilepsy, anæmia, dropsy, palsy, hydrocephalus, and complete idiocy. A return, however, to health is its most common issue. In a case related by Dr. ELLIOTSON, it terminated in apoplexy; and Dr. BROWN refers to three instances in his practice, where it terminated in violent convulsions, with cerebral symptoms, coma, and death.

8. Its complication with rheumatism, rheumatic pericarditis, and disease of the membranes of the spine, was first demonstrated by the writer, in a case, the *post mortem* inspection of which is detailed in the fifteenth volume of the London Medical Repository; the connection having been subsequently confirmed by Dr. PRICHARD and by Dr. ROESER, who have met with similar cases. The association of chorea with hysteria is very frequent about the period of puberty; and when the former occurs, after this term. Indeed, the majority of cases exhibiting choreal symptoms at or subsequently to the epoch of puberty in the female, partake more or less of the hysterical character—in many instances to the extent of appearing as a modified form of hysteria, rather than as chorea: and, upon strict inquiry, some irregularity is generally detected in the accession or subsequent occurrences of the catamenia. Females who are attacked by, or have been subject to, chorea anterior to the period of puberty, occasionally experience at this age retention or postponement of the catamenial discharge; or, if this secretion at all appears, it is scanty and at irregular intervals. Both the chorea and disorder of the catamenia evidently depend upon a similar condition of the vital manifestations of the organic nervous system, and chylopoietic viscera. The following procession of morbid phenomena is not uncommon: chorea with defective action of the digestive, assimilating, and secreting functions, and torpor of the liver; at a subsequent term, protracted catamenia, or scanty and irregular appearance of the secretion, occasionally with various hysterical affections, seldom amounting to a complete fit of the hysteria; and, lastly, when the catamenia become established, the hysterical af-

fection is sometimes more fully pronounced; and, with the regular establishment of the uterine functions, the chorea disappears. Dr. WHITE relates the case of a lady, aged 42, who appears to have been the subject of chorea of an irregular or rather doubtful character, and liable to attacks of hysteria. In this case, which has been too readily admitted by Dr. GOOD as one of chorea, the menstrual discharge is reported to have been regular; but it is probable that in this, as many other instances of diseases occurring in females, a more strict inquiry would have detected some derangement in the uterine functions.

9. C. The appearances found on dissection of fatal cases are rather referrible to the complications than to the disease itself. In general, the body is somewhat emaciated, and the muscles soft, flaccid and pale. The stomach, bowels, and associated viscera present only contingent lesions: they are, however, often flaccid and pale, sometimes with a slight effusion of serum in the peritoneal cavity. In a few instances, signs of irritation of the uterus have been observed. Dr. HAWKINS, found, in a case he examined, besides increased vascularity of the uterus, earthy concretions in the pancreas, omentum, and mesentery, with tubercles in the lungs. In the fatal cases recorded by Dr. PRICHARD, Dr. ROSEN, and myself, adhesions of the opposite surface of the pericardium, with effusion of serum in it, and slight effusion into the pleura, were observed. In a case which occurred in my practice, the surface of the heart was covered in parts with coagulable lymph; its cavities were much enlarged, and their walls thin, pale, and flabby, resembling the muscles of white-fleshed animals. M. DESERRIERE met with effusion of serum into the pericardium. SOEMMERING states, that he detected the results of inflammatory action in the membranes of the brain; and several authors have made mention of small ossific deposits in the arachnoid of the dura mater. Dr. BROWN, in the only one, of the three cases which terminated with convulsions and coma, that he had the opportunity of examining, found congestion of the vessels of the brain, with slight serous effusion between the membranes, and in the ventricles, and a *calcareous concretion* of a cubic form, and the size of half an inch, in each side, in the medullary substance of the left hemisphere,—the convulsive movements having been chiefly on the left side of the body. Dr. COXE found the vessels of the brain congested, and twelve ounces of serum in its ventricles: Dr. WILLAN, also, in two instances, observed several ounces of serum in the ventricles of the brain. Dr. PATTERSON describes appearances of the membranes, consisting of vascular congestion with effusion of serum, and states, that a patient cured of the disease very soon died of hydrocephalus. M. SERRAS found, in one instance, a fatty tumour resting on the tubercula quadrigemina; in another, appearances of increased vascularity, with sanguineous effusion; and in two others, inflammation of this part of the brain. He further states, that, in experiments on living animals, he remarked injury of these parts to produce phenomena resembling chorea; but he at the same time admits that he has sometimes met with cases of chorea, in which no diseased appearances in the brain could be detected after death. In a case which occurred to me in 1819, complicated

or rather alternating with rheumatism, with metastasis of this disease to the heart, and subsequently to the membranes of the spinal chord, inflammatory appearances, with coagulable lymph, and an effusion of turbid serum, were found through nearly the whole extent of these membranes, the patient having died in a state of universal paralysis. Changes in the spinal membranes similar to those described by me were observed in the four very interesting cases detailed by Dr. PRICHARD: in these latter, also, more or less congestion of the vessels, with effusion of serum between the membranes, and in the ventricles of the brain, was remarked. Dr. ALIPRANDI has also detailed a case, in which morbid appearances similar to those described by myself and Dr. PRICHARD were found in the spinal canal.

10. II. DIAGNOSIS AND PROGNOSIS.—a. This disease, in its ordinary states, may be distinguished from other affections of a similar kind by the permanency, the clonic, and the partly voluntary nature of the movements, and their cessation during sleep. In *convulsions*, the movements, however irregular, and in other respects resembling chorea, are not continued, are not even partially under the influence of the will, and are of the most violent or tonic kind. The disease to which the name chorea was originally given approached nearer this latter description, but presented no uniform character,—various nervous disorders, very different from each other in many of their essential symptoms and pathological states, as the nervous affections resulting from the bites of the tarantula or other insects, irregular forms of hysteria, and convulsion, receiving this appellation; and, even at present, many irregular forms of convulsion, particularly those of a clonic kind, are often confounded with chorea. The only other disorder for which it may be mistaken is *paralysis tremens*, which occurs at a later period of life than chorea, is generally more limited to a single limb or part of the body, the movements being more of a tremulous than of a spasmodic kind, and to a much less extent; and not partaking of the starting, jumping, twitching, and ludicrous character possessed by those of chorea.

11. b. The *Prognosis* in the simple or uncomplicated state of chorea is generally favourable. But when it comes on after attacks of rheumatism, or in conjunction with this disease; if it follow the disappearance of the acute or chronic exanthemata and eruptions, or arises from injuries of the head, or from manustupration; if it be associated with epileptic convulsions, or with more or less complete paralysis of some limb or part; and if signs of anæmia, chlorosis, dropsical effusion, affection of the functions of the brain, or idiotcy, manifest themselves, an unfavourable, or at least a cautious, opinion of the result should be offered. It would seem that the disease is more severe or more frequently complicated in large cities, or in some places, than in others, for the very different results of practice cannot otherwise be well explained. Dr. PARR states, that in about sixty cases, in which the treatment very generally employed by other physicians was resorted to, all recovered, and only two had relapses. I have met with three or four fatal cases; Dr. PRICHARD has recorded four; Dr. BROWN refers to three in his practice; and I have occa-

sion to know that a similar issue is not rare in cases occurring both in London and in Paris.

12. III. CAUSES.—*A. Predisposing.* Chorea is much more frequent in the female than in the male sex. According to the experience of HERBERDEN, THILENIUS, J. FRANK, REEVES, MANSON, ELLIOTSON, and myself, three of the former to one of the latter are affected by it. The most common period of life is from seven years to fifteen—from second dentition to puberty; but no age is entirely exempt from it. M. BOUTEILLE met with it in a lady of 80, complicated with hemiplegia; Dr. POWELL and Dr. MATON, in females of 70; Dr. CRAMPTON, in a female upwards of 40. I have seen it in a man upwards of 50; and cases sometimes occur as early as five or six years. The nervous temperament, and great sensibility of the nervous system; hereditary disposition; constitutional debility from whatever cause, either from original conformation, or from bad or deficient nourishment in early infancy; particularly an insufficient supply from the mother or nurse's breast, or total deprivation of this nutriment; effeminate education, and premature exercise of the mental powers; precocious excitement of the desires and affections; debility of the digestive and assimilative viscera; neglected state of the bowels, leading to accumulations of deranged secretions in the prima via; torpid function of the liver, and other secreting and assimilating organs; cold and moist climates; confinement or sedentary occupations in low, unhealthy, or crowded places; low or innutritious diet, especially vegetable food; impure miasmatic air; want of personal cleanliness; and the ricketty, scrofulous, and rheumatic diathesis; constitute the chief predisposing causes of the disease.

13. B. *Exciting causes.*—These are not often readily ascertained. The most common are the irritation of worms or of morbid matters accumulated in the bowels (STOLL, BALDINGER, WENDT), and fright. Dr. REEVES and Mr. BEDDINGFIELD state, that the great majority of cases which they treated was attributed to fright; and a nearly similar statement is made by STOLL and ECKER. Injuries affecting some part of the nervous system especially, as falls upon the head and back (GEASH, FRANK); the improper employment of lead, mercury, &c. (DE HAEN); suppressed eruptions, discharges, &c. (THILENIUS, DARWIN, and WENDT), particularly tinea capitis, itch, herpes, perspiration of the feet, &c.; metastasis, or extension of rheumatism to the membrane of the spinal chord (PLOCQUET, COPLAND, PRICHARD, &c.); previous disease, especially the eruptive fevers, epilepsy, hysteria, and mental disorder (SALLABA); second dentition; suppressed discharges; anxiety, the dread of impending occurrences, concealed mental impressions and moral emotions, and the influence of imagination (DARWIN, HAYOARTH), particularly if forcibly exercised imagination in connection with sexual desire; frequently excited jealousy and envy; masturbation, and retained, or difficult, or suppressed menstruation, particularly if occasioned by this practice (RICHTER, &c.), and cold long endured,—are all occasionally exciting causes of the disease.

14. IV. NATURE OF THE DISEASE.—Opinions as to the pathological state originating chorea have been extremely various. SYDENHAM considered

it as a species of convulsion, occasioned by a humour affecting the nerves. SAUVAGES, CULLEN, and many others, ascribed it to general debility, attended by unusual mobility of the system; and several writers, among whom I may notice BOUTEILLE, CLUTTERBUCK, SERRES, LISFRANC, &c., to inflammatory action of some part of the cerebro-spinal axis; thus viewing it as intimately related to paralysis. Dr. HAMILTON attributed it to disordered functions of the bowels, affecting the muscular actions sympathetically; and a very large number of writers, to debility deranging principally the nervous and muscular systems; the torpid states of the organic functions being a related or associated manifestation of disorder.

15. A. The exact seat, as well as nature, of the disease can be inferred with accuracy only from attentive observation of the causes in relation to the states of the system at its commencement, of the phenomena in its course, and of the structural changes existing in cases which have terminated fatally. The writer was the first who demonstrated, by *post mortem* research, inflammatory appearances of the membranes of the spinal chord; but he cannot on that account infer that the disease is owing to that cause. Indeed, in the case in which he observed it, the affection of these membranes was recognised, during the life of the patient, as a contingent lesion arising from metastasis of the rheumatism with which it was associated. M. SYRRES, having found disease of the *corpora quadrigemina* in four cases, considers these bodies as the seat of chorea, and thinks the results of his experiments, and of those of MM. FLOURENS and ROLANDO, on the functions of this part of the brain, countenance this opinion. Other pathologists, particularly MM. BOUILLAUD and MAGENDIE, conceive that it is seated in the cerebellum, because the functions which they ascribe to this organ are chiefly affected—the disease, in their opinion, consisting of disorder of the actions of this part. If we reflect, that a number of disorders, more or less resembling each other, have been considered as chorea; that these, as well as chorea itself, are often complicated with, or run into, other affections of an organic or inflammatory kind; and that it is never fatal excepting in consequence of its consecutive and associated changes, especially those affecting the brain and spinal chord; the diversity of lesion observed after death, and of opinions derived from this source chiefly as to its seat, will not appear surprising.

16. I think that chorea, in its simple state, occurs most commonly in persons whose vital powers are depressed, the whole circle of vital organs performing their functions imperfectly, and thereby occasioning increased susceptibility of the nervous system. This state constitutes the aptitude to be affected by the exciting causes of this disorder; whether those acting directly upon the brain, through the medium either of the mind itself or of the senses, as terror, fright, mental impressions, moral emotions, &c.; or those which influence indirectly the cerebro-spinal nervous system, by irritating or otherwise disordering the organic nerves, as worms, morbid matters in the prima via. The susceptibility of the frame having been induced, either class of causes may occasion the malady,—the former, by changing the condi-

tion of those parts about the base of the brain which direct or influence the functions of the spinal chord, and, through it, of the voluntary muscles, — the latter, by disordering the functions of the organic nervous system, and thereby affecting, through the medium of the branches communicating with the ganglia placed on the roots of the spinal nerves, the nerves of voluntary motion; occasioning the irregular muscular movements constituting the disease, in the same manner that irritation of the visceral nerves produces the automatic movements of the *fœtus in utero*. In such cases, the disorder of the organic nerves may be extended, by means of the sympathetic, to the spinal nerves either of one side only, or of both, as well as to the nerves and parts about the base of the brain, disease being also subsequently induced in those parts of the brain or spinal chord in which they originate. According to this view, will readily be explained the frequent connection of chorea with hysteria and uterine disorder, as the patient advances through the period of puberty and adolescence, as well as the disappearance of the disease after the development of the sexual organs, and the healthy establishment of the uterine functions — events intimately related with, and necessary to, the due manifestation of vital energy throughout the frame.

17. In other words, therefore, the *proximate* cause of chorea, in its simple and true form, seems to consist of debility, with some degree of irritation of the organic or ganglial class of nerves, extended more or less to those of volition, and occasioning morbid susceptibility of the nervous system generally, with diminished power, increased mobility, and irregular actions of the muscular system, particularly of those muscles supplied with the nerves principally affected. Whilst this appears to be the pathological state of the majority of cases of chorea, yet instances not infrequently occur in which disorder evidently commences in the spinal chord or its membranes, disturbing the functions of the nerves issuing from the affected part. In many cases, the lesion of the chord and of its membranes is occasioned by irritation propagated to the roots of the voluntary nerves; but in those which are connected with rheumatism, as well as in some otherwise related and produced, the mischief evidently originates in the membranes of the chord itself. When, however, the disease commences in the organic nervous system, affecting the voluntary nerves only secondarily, pain is not complained of upon examining the spinal column; but when it is seated in the chord or its membranes, pain or uneasiness is felt in this situation, and the disordered motions are more or less limited to particular parts. When the original cause of mischief is seated in the brain, or when the cephalic organs become consecutively diseased, the affection partakes more of the characters of true convulsion, either with or without hysterical symptoms, but most commonly with such phenomena.

18. V. OF NERVOUS DISORDERS RESEMBLING CHOREA. — Whilst true chorea, according to the application of the term in recent times, seems to originate in the organic nerves, and to disturb the functions not only of the voluntary nerves, as explained above, but also of those parts of the cerebro-spinal axis in which they originate; the affections

I am about to notice, most commonly depend upon a disordered state either of the mind, or of some of the parts within the cranium, and are often attended by more or less affection of the generative and digestive organs. The disease to which the name *Chorea Sti. Viti* was first applied, very nearly resembled that produced by the bite of the *tarantula*, as it is described by BAGLIVI and SAUVAGES; and, if the description of the former disorder furnished by SCHENCK, PARACELSUS, and FELIX PLATER had not been confirmed by the more accurate observation of modern practitioners, it might have been viewed as greatly exaggerated, if not entirely feigned. *a.* The chorea of the writers of the sixteenth century appears to have consisted of inordinate muscular exertions and movements in regulated measures, proceeding from an irresistible mental impulse, excited by the influence of music or imitation on the mind. HORSTIUS states, that it sometimes recurred annually at the same period; and that the sound of music often increased it to a state of phrensy, those affected continuing dancing for an incredibly long period, in a most excited manner. It appears to have consisted chiefly of a sort of lascivious dance, kept up an uncommon length of time, until the impulse to excessive muscular motion was subdued by exhaustion, and has not inappropriately been called *Morbus Saltatorius* and *Epilepsia Saltatoria* by later writers. *b.* According to the account given by BAGLIVI and SAUVAGES of the effects of the bite of the *tarantula*, the patient is seized, a few hours after the injury, with difficulty of breathing, anxiety, and sadness. The violent symptoms of the first days are succeeded by a peculiar melancholy, which continues until, by dancing or singing, it is at last entirely removed. Persons thus affected frequent churchyards and solitary places, lay themselves out as if they were dead, evince the utmost despair, howl and sigh, assume various indecent attitudes, run about, or roll themselves on the ground, and are either pleased with or dislike particular colours. Shortly after being stung, they fall down, deprived of sense and motion, either breathing with difficulty and sighing heavily, or lying as if quite dead. Upon the sound of music they begin to move their fingers, hands, feet, and successively all the parts of the body, sighing, dancing, and assuming a thousand fantastic gestures. They continue these motions for several hours, until they are exhausted, and covered by perspiration; but they return again, after some repose, to this violent exercise, which is kept up for ten or twelve hours each day, during four or five, but seldom so long as six days. This affection has received various names from Continental writers, amongst the chief of which are *tarantismus*, *tarantulusmus*, *Choreomania*, *Melancholia saltans*, *Chorea Sti. Johannis*, *Chorea Sti. Valentini*, and *Damonomania*.

19. According to the above account of both affections — the original chorea of the Germans, and the *tarantismus* of SAUVAGES — there appears to be but little difference between the latter, at its advanced or second stage, and the former. It is very difficult to believe that the whole, or at least the greater part, of the phenomena in both these affections was not feigned. It is, however, admitted, that the poison of the *tarantula* spider is most successfully counteracted by the exciting

influence of music on the mind, and the profuse perspirations produced by continued dancing. A writer in the *New York Medical Repository* details an instance of a convulsive disorder occasioned by the bite of a spider, and cured by music. Mr. KINDER WOOD has recorded a case, which originated in disordered menstrual function, with cerebral symptoms and painful affections of the nerves of the face, that resembled in every respect the malady to which the German physicians gave the name of chorea.

20. The disorder, also, which has usually been called the "*Leaping Ague*" in Scotland, seems to be very closely allied to the original chorea. It is described very nearly as follows by a writer in the *Edinburgh Medical and Surgical Journal*:— Those affected first complain of a pain in the head or lower part of the back, to which succeed convulsive fits, or fits of dancing, at certain periods. During the paroxysm, they distort their bodies in various ways, and leap about in a surprising manner. Sometimes they run with great velocity even in dangerous places, and when confined, climb or leap from the floors of the cottages to the rafters, or swing by, or whirl around, one of them. They often dance or leap about with greater agility, vigour, and exactness than they are capable of exerting at other periods; the affection apparently consisting chiefly of a morbid and irresistible propensity to dance, tumble, and run about in a fantastic manner. Cases of this form of disorder have been detailed by TULPIUS, PENADA, REIL, BRÜCKMANN, WESTPHAL, CRICHTON, PIEDAGNEL, LAURENT, and others. In M. PIEDAGNEL's case there was a propensity to run forwards, until the patient, a man, dropped down exhausted. On examining the brain after death, tubercles were found pressing on the anterior part of the hemisphere. A similar instance occurred in the father of a medical friend, and terminated in paralysis. The subject of M. LAURENT's case was propelled backwards with considerable velocity.

21. Dr. WATT has given the history of a disorder which he has called chorea, or periodical jacitation, in a girl of ten years, that was preceded by excruciating headach and vomiting. To this affection of the head succeeded the propensity to turn around in one direction on her feet with great velocity, like a spinning top. This propensity subsided after having continued above a month, but was followed by an exasperated return of the headach, and loss of power over the muscles of the neck. She was afterwards seized by a different kind of motion, occurring in fits, which lasted daily, from two or three, to six or seven hours; this consisted in placing herself across the bed, and rolling rapidly round on her sides from one end of it to the other. When laid in the shallow part of a river she rolled around, although at the point of being drowned. The affusion of cold water did not stop the rotations, which were about sixty in a minute. In a little more than a month these movements were replaced by others of a different kind. She now laid herself on her back, and, drawing her head and heels towards each other, raised her trunk, afterwards falling with some force on her back by straightening her body. These motions were repeated ten or twelve times in a minute, were continued for about five weeks, and were then fol-

lowed by the propensity of standing upon her head. Having raised her feet perpendicularly upwards, she fell down as if dead, but instantly placed herself on her head as before, again fell, and continued to repeat these movements for fifteen hours a day, and as rapidly as twelve or fifteen times a minute. The affection had resisted emetics, cathartics, local depletion, blistering, setons, &c., but disappeared after a spontaneous diarrhoea. Dr. WATT refers to two similar cases which had come to his knowledge; and another instance has been adduced by the writer, under the designation of "*Inquirer*," of an instructive article on the subject, in the third volume of the *Edinburgh Medical Journal*. Mr. HUNTER has also given the particulars of an instance of rotatory affection resembling chorea, in the twenty-third volume of the same work.

22. Dr. ROBERTSON has described a peculiar form of convulsion, in many respects like chorea, which spread at one time (1800) as an epidemic amongst a sect of religious enthusiasts in the states of Tennessee and Kentucky, evidently from the influence of imagination and irritation on morbidly excited minds. The seizure was violent, and distinctly convulsive at the commencement, but it usually passed from this state into one more chronic, and more nearly approaching chorea. Persons thus affected are described by Dr. ROBERTSON as being continually interrupted in their conversation by the irregular contractions of the muscles, and as having no command over these contractions by any effort of volition; lying down in bed does not prevent them, but they always cease during sleep. Remissions and exacerbations are common, but occur without regularity. During the remission, a paroxysm is often excited by the sight of an affected person, but more frequently by shaking hands with him. The sensations of the patient during the fit are said to be agreeable, and are expressed by the enthusiastic by laughing, shouting, dancing, &c., followed by fatigue, and a sense of general soreness. The affection at last becomes slighter by degrees, and finally disappears. Cases of similar nervous disorders, and apparently intermediate between chorea and convulsions, and often partaking of many of the features of hysteria, as well as the affection called *Malleatio*, have been detailed by TULPIUS, HORSTIUS, MORAGNI, WICHMANN, MAJENDIE, and others above referred to (§20.). It is difficult to believe, however, upon perusing the particulars of the foregoing cases, that they are altogether the actual phenomena of disease. It is very probable that the morbid affection of mind, — the disordered state of the desires, or of the mental impressions, — exalts the derangement of the nervous system to that singular pitch, of which these cases are rare examples. (See arts. CONVULSIONS, and HYSTERIA.)

23. VI. TREATMENT. — A. *Conspectus of the treatment.* Purgatives have been recommended in chorea by SYDENHAM, WHYTT, HAMILTON, CHEYNE, and others. SYDENHAM, however, did not confide the cure of this affection to them entirely, for he also directed occasional depletion, with tonics in the days intervening between the exhibition of the purgatives, and narcotics at bedtime. *Emmenagogues*, particularly aloë, myrrh, assafoetida, hellebore, savine, castor, the melissa officinalis, spiritus ammoniæ succinatus, saffron,

borax, &c. have been very properly prescribed by RICHTER, SCHMIDTMANN, and several other German writers, particularly when the disease occurs about the period of puberty, and is connected with hysteria, or disorder of the menstrual discharge. *Anthelmintics* are the chief medicines advised by HUFELAND and THILENIUS. WATT and SALLABA viewed the disorder as possessing an inflammatory character, and therefore directed for it the antiphlogistic regimen. *Tonics* have found supporters in DOVER, WERLHOF, MAHON, ECKSTEIN, HILDEBRAND, ELLIOTSON, and many other writers. But they do not agree in the kind of tonic which should be employed: thus, HILDEBRAND prefers the *sulphuric and mineral acids*; WERLHOF and MAHON, the *cinchona bark*; GRIFITH prescribes the bark, with the carbonate of *potash*. ECKSTEIN, WENDT, and ELLIOTSON recommend the preparation of *iron*, in preference to other tonics. The *fixed alkalies* have been noticed favourably by WENDELSTATT; and the mineral springs at Ems by BRÜCKMANN. Sir GEO. BAKER, NAGEL, and MICHAELIS prescribed the flowers of the *cardamine pratensis*; the latter in doses of a drachm every six hours. The leaves of the *Seville orange tree*, in the form of powder, decoction, or infusion, were much praised by DE HAEN, WESTERHOF, WERLHOFF, and ENGELHARD. The *arnica montana* received the commendation of THEUSSINK; and the *chenopodium amroisoides*, that of PLECK and of ECKER.

24. *Narcotics and sedatives* have also been prescribed in this affection. The inspissated juice of the root of the *belladonna* was employed in doses of one sixth of a grain, with apparent advantage, by STOLL, LENTIN, and KETTERLING. STOLL, however, directed at the same time friction with a liniment composed of the *spiritus serpilli*, *essentia castorei*, and camphor, to which I am inclined chiefly to attribute the benefit derived. M. ALLAMAND has likewise prescribed *belladonna* with advantage. *Stramonium* was used by SIDREN; *digitalis* by UWINS and some others; and *opium* by SWAINSTON. The *prussic acid* has lately received the commendation of Mr. STUART. He employed it in two cases, after purgatives had been exhibited in large doses, with decided advantage. The *prussiates* of iron or of zinc are also productive of benefit.

25. *Antispasmodic* remedies have been resorted to by several physicians. *Camphor* has obtained a well-deserved notice from WERLHOFF, MAHON, WILSON, and others. The *cuprum ammoniatum* has been prescribed by Dr. WALKER, after alvine evacuations, and found beneficial in cases where bark and other tonics have failed. WILLAN, UWINS, DELARIVE, and THEUSSINK have also spoken of it favourably; and MERK carried it so far as to produce an emetic effect. *Valerian* has been recommended by BOUTEILLE, BENNETT, MURRAY, GUERSENT, &c. After the bowels have been evacuated, it is in many cases an excellent remedy, either given by the mouth, or administered as an enema. The *oxyde of zinc* has received a very extensive trial in this affection from HART, BURSERI, THILENIUS, SCHRAUD, WRIGHT, HUFELAND, and KERST. STOLL, however, states that no benefit is derived from it, although pushed to a great length. I have seen much more advantage produced from the sulphate than from the oxide of zinc. Although the oxide may be

given without advantage, and irritate the stomach, the addition of a full dose (gr. ij.) of the *cuprum ammoniatum* in combination with the zinc will be borne without inconvenience. This fact, which was first noticed by Dr. ONIER, of Geneva, in a letter to Dr. DUNCAN, may be taken advantage of in the treatment of chorea; for I am not aware that it has as yet been acted upon in respect of this disease. The *nitrate of silver* has likewise been fully employed, and certainly with benefit if purgatives have been premised. FRANCK, UWINS, and CRAMPTON have found it successful in extremely obstinate cases.

26. *Arsenic*, in the form of Fowler's solution, has also been directed with advantage in severe cases of chorea, especially after free alvine evacuations have been procured, by Mr. MARTIN, Dr. SAITER, and Dr. GREGORY. *Iodine* has been given by Dr. MANSON, Dr. GIBNEY, Dr. PELTZ, and myself; and, when judiciously prescribed, particularly when the disease appears about puberty, and is connected with obstructed menstruation, is often of great service. In cases of this kind, a blister applied over the sacrum, as recommended by Dr. CHISHOLM and Mr. SWAN, and found beneficial by them, has been productive of marked advantage in my practice. The propriety of *scarifying* deeply the gums, when the affection occurs about the period of second dentition, has been very properly insisted upon by Dr. GREGORY and Dr. MONRO.

27. The *cold bath* has been much used by M. DUPUYTREN in chorea, and *sea bathing* has been recommended by HUFELAND and HIMLY; but the *shower bath*, or the simple *affusion of cold water* on the head whilst the patient is seated, is preferable at first, in my opinion. If the shower bath be directed in cases of females, the patient should stand, whilst receiving the bath, in a pan of warm water. Dr. FERRARI prescribed with benefit a solution of *tartarized antimony* internally, and *ice* along the vertebral column, followed by immersion daily in a cold bath, and by purgatives, bitter tonics, and hyoscyamus. *Setons, issues*, and *moxas* in the neck, or over the vertebrae of the back, have also been employed by several practitioners. Dr. ALIFRANDI, however, relates a case where *issues* and *moxas* proved of no service. Drs. PHYSICK and YOUNG have made use of the *black snakeroor*, the *cimicifuga racemosa*, and experienced decided advantage from it. This substance seems to act more rapidly than others in the cure of the disease, and without any sensible action on the secreting functions. It is given in doses of from ten grains to a drachm. The animal oil of Dippel has been found of service by WERLHOF; the *cajeput oil* by RAMSPER; and the *cod* and *tusk-liver oil*, and *spirits of turpentine* by the author, who first prescribed them in this disease. *Electricity* has been suggested by DE HAEN, FOTHERGILL, SCHAEFFER, &c.; and *galvanism* by several writers. Large doses of *musk* were directed by Dr. MATON and Dr. POWELL, after free alvine discharges had been procured.

28. Respecting the propriety of *blood-letting* in chorea, much contradictory evidence has been furnished. SYDENHAM prescribed it as a subsidiary remedy; Dr. CELLEN states that it was sometimes useful, at other times injurious; Dr. WATT obtained, he informs us, decided advantage from the practice; Dr. ARMSTRONG found

it very hurtful; and Dr. CLUTTERBUCK trusted to it almost entirely, repeating it several times after intervals of a few days. M. BOUTEILLE viewed the disease as either congestive or inflammatory, and commenced the treatment with blood-letting, which he generally repeated, and with purgatives. M. SERRAS, having observed vascular turgescence about the corpora quadrigemina in four fatal cases, has recommended *leeches* and *counter-irritants* to be applied to the upper part of the spinal column; and M. LISFRANC, also, has directed blood-letting and leeches to the nape of the neck. Dr. HUNTER and Dr. HARROWER have depended upon purgatives and the inunction of the *tartar emetic ointment* on the scalp and along the spinal column. *Aromatic liniments* to the spine were directed by CHRISTIEN; the turpentine and camphor *embrocation* to the same situation, by the author; and *tartar emetic plasters* by Dr. JOHNSON, who also advised a grain of the nitrate of silver, with two grains of pilul. hydrarg. and five of the extr. colocynth. comp. as a purgative. It may further be added, that ECKER justly insists upon the superiority of *sulphur* as a purgative in this disease. The application of *blisters* to the spine has been recommended; but, in two cases in which I have had recourse to this practice, I thought the effect was injurious rather than beneficial.

29. *B. Treatment recommended by the Author.*—A careful consideration of the nature of the disease will readily suggest a rational treatment. The *first indication* is to remove morbid secretions and fecal accumulations, the usual cause of irritation of the organic nerves. The *second*, to subdue vascular irritation or erythlism of the vessels of the spinal chord or brain, when the symptoms indicate its existence. The *third*, to rouse the energy of the organic nervous system, and the vital actions of the assimilating and secreting organs, and to impart energy to the frame. *a.* A judicious employment of purgative remedies, varied according to the peculiarities of the case, and the states of the patient's system, is indispensable to the fulfilment of the first intention. When the disease appears previously to approaching puberty, it is not very material what kind of purgatives are first prescribed: but it should be recollected, in the treatment of this disease, perhaps, more than in many others, that a judicious combination of purgatives, with tonic, or stimulating, or antispasmodic remedies will more rapidly restore the patient than confiding in purgatives merely. Indeed, we are enabled, by such combinations, partly to accomplish two indications of cure at the same time; and frequently we secure a more decided operation on the bowels and secreting viscera by the combined means. It will very generally be necessary to commence with the exhibition of a full dose of calomel, either alone or with other purgatives, or followed by them five or six hours afterwards: but the doses of calomel ought not to be frequently repeated in this disease; nor, in my opinion, will it be found serviceable to continue purgatives long, without either exhibiting them with a bitter tonic or antispasmodic remedy, or with both, or alternating them with these remedies. When purgatives are thus prescribed, they may be continued longer, not only without producing any detriment, but generally with decided advantage. Cases will

not infrequently occur, in which little or no benefit can be remarked until they have been given almost unremittingly for a long period—the evacuations being at first nearly natural, but afterwards betraying disorder, and proving that the repeated exhibition of purgatives was requisite to unload the biliary ducts and gall-bladder, and remove fecal matters retained in the cells of the colon. For this purpose, I have generally preferred the compound infusions of gentian and senna, in equal proportions, with some antispasmodic and a corrigent. This combination seldom acts frequently, but usually copiously. The oil of turpentine, either followed, soon after its exhibition, by some other purgative, if it does not act upon the bowels, or combined with it, is extremely beneficial; and, whenever the evacuations are offensive, or of a morbid appearance, especially if the case be complicated with worms, ought never to be neglected. In such cases, a single dose of calomel at bed-time, followed, in the morning, with the turpentine, combined with castor oil (in the proportion of three parts of the former to two of the latter), and floating on the surface of milk, or some aromatic water, is most decided. In this affection especially, the medical attendant should examine carefully the state of the evacuations, and be guided, in a great measure, by their appearance, as to the repetition and selection of purgative medicines. The benefit derived from this class of remedies in chorea was sufficiently demonstrated by D^r. HAMILTON and PARR, and, although questioned by several practitioners of the present day, cannot be denied. Instances of their failure have been chiefly owing to the neglect of combining them in the manner insisted upon above, or of exhibiting tonics, stimulants, or antispasmodics, in the intervals between their operation. The good effect of treatment, as well as the operation of purgatives, will be much enhanced by rubbing either of the liniments F. 296, 311, on the loins or abdomen, once or twice daily, and by allowing a light nutritious diet, chiefly of animal food.

30. *b.* Contemporaneously with the fulfilment of the *first indication*, the *second* should receive due attention. In many cases, the means used to accomplish the former will be sufficient to remove existing irritation about the roots of the voluntary nerves; but when we have marked evidence of irritation of these parts, or of determination of blood to any part of the cerebro-spinal axis or investing membranes, either in the state of the pulsation of the carotids increased temperature of the head, coldness of the extremities, tenderness or pain from the occiput along the spinal column, particularly when pressing between the vertebrae on each side of the spinous processes, the application of leeches behind the ears or along the spine, and repeating them according to circumstances, or cupping in that situation, will be requisite, and not incompatible with the use of tonic and antispasmodic medicines, in cases presenting symptoms indicating the propriety of resorting to them. After leeches, the cold affusion on the head or on the spine, night and morning, or the shower bath; rubefacient liniments to the latter situation, or the tartar emetic ointment or plaster; warm woollen clothing on the lower extremities, and attention to the mental emotions; constitute important parts of the treatment.

31. An accurate idea of the remote causes of the disease, as well as of their probable operation and continued effect, should lead not only to their removal as far as possible, but also to a treatment modified accordingly. The mental impressions and moral emotions are often more or less affected, particularly in those irregular forms of disorder, which have very generally been confounded with chorea. This circumstance should not escape the attention of the physician, as it points to the employment of moral management in aid of medical measures. As the mental affection, when it exists, has generally an intimate relation to the remote causes of the disease, the importance of ascertaining the existence of the former, as well as the nature of the latter, as a basis of an appropriate treatment, must be manifest.

32. c. Having removed accumulations of morbid matters, and subdued irritation existing about the origin of the voluntary nerves, or in parts of the cerebro-spinal axis, or enveloping membranes, and having excited the actions of the secreting and assimilating organs by the means stated above, the third intention of cure is to be now entered upon in a more decided manner, by the exhibition of tonics combined with antispasmodics, and by due attention to the state of the bowels, and functions of the secreting viscera and surfaces. The combination or alternation of bitter tonics with aperients and antispasmodics will often be necessary during this stage of the treatment; or an occasional dose of a brisk purgative, or of calomel, will be exhibited with advantage during the employment of tonics. Even when the bowels are so active as apparently to render this interference unnecessary, a dose of the pilula hydrargyri, given once or twice a week, either with or without the pilula aloë cum myrrha, will be found serviceable. As to the choice of tonics, no immutable rule can be laid down. The state of the pulse, and of the secreting organs, should be the chief guide in the selection of them. Attention to the mode of combining them is also of much importance. Bark, in any form, will be beneficial when judiciously prescribed. The following powder will be found serviceable, and may be taken in some aromatic water; the doses of the ingredients being varied according to the age of the patient, and the state of the bowels:—

No. 126. R. Pulv. Cinchonæ gr. xij; Pulv. Rhei gr. viij; Sodæ Sub-carb. gr. x; Pulv. Capsici Annui gr. ij. Misce.

If the decoction be preferred, it will be found most beneficial when given with liquor ammoniæ acetatis, and a little of the spiritus ammoniæ aromaticus. The sulphate of quinine is an excellent medicine, especially when the patient is old enough to take it in the form of pill, when it may be most advantageously combined with aloës, as in F. 572—577., or with camphor and aloës as follows. In this state of combination a decided action will be exerted on the bowels:

No. 127. R. Camphoræ rasæ, Quinina Sulphatis, ʒss; Extr. Aloës Purif. ʒss; Extr. Gentianæ (vel Pilul. Galban. Comp.) ʒj; Syrup. Simp. q. s. M. Fiat Pilulæ xxxvj., quarum capiat binas bis quotidie.

33. In this stage of treatment much advantage will often be obtained from valerian, combined with other antispasmodics and tonics, or with the alkalies (F. 269. 368.); from the preparations of iron, as recommended in the article on Cytosis, (§ 13.), or in F. 521. 523.; and from the sulphate

of zinc (F. 582—587), or the arsenical solution (F. 364.). As chorea is sometimes complicated with disease about the heart, or the roots of the voluntary nerves, or the membranes of the brain or spinal chord, of an inflammatory nature, care should be taken not to exhibit this last active substance, or even the preparations of iron, or of bark, until the symptoms of these complications have been removed by local depletions, cold affusions, or the shower bath, and counter-irritation. A similar precaution is still more requisite in respect of the employment of strychnine, or the nux vomica (see F. 443. 541, 542. 565. 907.), which I have found of much service in the advanced course of treatment of the simple form of chorea, or when it has been associated with rheumatism of the joints or extremities, with chlorosis, hysteria, or amenorrhœa; in which complicated states of the disease I have likewise found the tincture of iodine, and hydriodate, or ioduret of hydriodate of potash of great service (F. 234. 722.). The formulæ for the above medicines given in the Appendix, or the following, may be adopted:—

No. 128. R. Olei Valerianæ M xij; tere cum Sacch. Purificati ʒijss; tum adde Infus. Valerianæ ʒvjss; Liq. Arsenicalis M xv. ad. xxx. Misce. Capiat cochlearia duo larga ter quotidie.

No. 129. R. Pulv. Calumbæ gr. x; Pulv. Valerianæ gr. xij—ʒj; Carbon Ferri Præp. gr. x; Pulv. Cinnam. gr. vj. M. Fiat Pulvis, vel Electuarium molle cum Syrup. Zingib. q. s., bis terve quotidie sumatur.

No. 130. R. Carbon Ferri Præp. ʒss; Pulv. Supertart. Potassæ ʒvj; Confection. Sennæ, Syrup. Zingiberis, ʒss ʒss. Misce. Fiat Electuarium, ejus capiat Cochlearia unum minimum mane nocteque.

No. 131. R. Carbon. Ferri; Sulph. Præcip. ʒss ʒij; Potassæ Supertart. Pulver. ʒvj; Confectionis Sennæ et Syrup. Zingiberis ʒss ʒss. Misce. Fiat Electuarium. Sumatur Coch. unum minimum mane nocteque.

No. 132. R. Sub-boratis Sodæ, Supertart. Potassæ, ʒss in Pulv. ʒij; Carbon. Ferri ʒij, Confectionis Sennæ ʒij; Syrup. Zingiberis q. s. ut fiat Electuarium molle, ejus Cochlearia unum minimum mane nocteque sumatur.

34. During the use of these medicines, the tartarized antimonial ointment or plaster may be applied to the spine; and when the tonics are not combined with aperients, the former may be exhibited in the course of the day, and the latter at bed-time, as they may be required. The nitrate of silver may also be tried in doses of half a grain, or a grain, combined with aloës, or the aloës and myrrh pill.

35. C. The treatment of the complicated and irregular states of this disease must necessarily be modified according to the diversified form it assumes. The association of the disease with rheumatism has been observed by me on several occasions, and, in nearly all, there has been a marked disposition of the rheumatic affection to recede from the joints or extremities, and attack the internal fibro-serous membranes, as those of the cerebro-spinal axis and the pericardium. This unfavourable result has generally been promoted by a too lowering treatment; but prevented by tonic and stimulating medicines, with due attention to the alvine evacuations. In cases, therefore, complicated with rheumatism, chlorosis, anæmia, or retention of the menses, the purgatives selected should be of a warm and stomachic kind, or combined with cordial and stimulating substances; the ammoniated tincture of guaiacum, camphor, serpentaria, and similar medicines, being also employed. In these states of disease, the internal use of the cod or skate-liver oil will be found most beneficial. Having observed instances

in which the suppression of the rheumatic affection of the joints by the use of embrocations and liniments was rapidly succeeded by the appearance of internal disease, the application of such remedies to the external seat of the rheumatic disorder should not be resorted to.

36. In the *irregular forms* of chorea, particularly those which present more or less of an hysterical character, the functions of the uterus, and the circulation of the brain or spinal chord, or both, are often disordered. In these it will be requisite not only to evacuate the bowels freely, but also to allay uterine irritation, where it seems to exist, by leeches applied to the tops of the thighs, or cupping over the sacrum, and to promote the monthly evacuation, when scanty or retained, by purgatives and emmenagogues. In many cases of this description, the application of a number of leeches to the occiput, neck, and behind the ears, the cold affusion on the head, or the shower bath, with warm clothing on the lower part of the body, and due regulation of the moral emotions, will materially aid the treatment. The more the attack assumes the characters of tonic convulsion, the more requisite will it in general be to have recourse to local depletions, especially if the affection occur after puberty, and be connected with interrupted menstruation.

37. During convalescence, and even in the advanced course of treatment, change of air, agreeable amusement, exercise in the open air, the use of chalybeate or aperient mineral waters, and a light nutritious diet, commencing with warm salt water bathing during the treatment, and concluding with cold salt water bathing in advanced convalescence, followed by smart frictions of the surface of the body upon coming out of the bath, will materially promote and confirm recovery, as well as prevent a return of the disease.

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CLIMACTERIC DECAY. — *Climacteric Disease*.

CLASSIF. 3. Class. 4. Order (Good). I. CLASS. V. ORDER (Auth.).

1. DEFIN. General decline of the vital powers, at the age of senescence, without any evident cause.

2. The ancients believed that very important changes took place in the economy at certain periods; the first being the seventh year, and the subsequent epochs answering to the numbers resulting from the multiplication of three, seven, and nine, into each other: as the twenty-first, the forty-ninth, the sixty-third, and the eighty-first years. The two last were called grand climacterics, as the life of man was supposed to have reached its allotted term. The doctrine of climacteric periods has been traced to PYTHAGORAS, who derived it from the Egyptians; and, although its truth has been denied by many eminent physicians, it has been believed in by others. The changes which take place at these epochs are of two opposite kinds; that of renovation, and that of decay. It is the latter of these which will here be considered.

3. SYMPTOMS. — This disease has been very minutely described by Sir H. HALLFORD. It usually comes on insensibly. The patient first complains of fatigue upon slight exertion; his appetite becomes impaired; his nights are disturbed or sleepless, and his mornings unrefreshed. The tongue is somewhat white; the pulse a little accelerated; the face emaciated, occasionally slightly bloated; the body emaciated, and the ankles and legs disposed to swell. The urine is not deficient, but the bowels are sluggish, and pains, with vertigo, are occasionally felt shooting through his head and various parts of the body, but are not possessed of the rheumatic character. As the vital exhaustion proceeds, the stomach loses all its powers; the emaciation is greater; the lower limbs are more oedematous; restlessness through the day and sleeplessness through the night increase, and all the vital manifestations,

too exciting. The effect of whatever is given should be carefully watched; and the articles of diet selected accordingly. When convalescence is established, the preparations of iron, and due attention to the states of the bowels, are most necessary.

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XV. HECTIC FEVER, SYN. — *Ἑκτική* (from *ἐκτάω*, constitutional, and this from *ἔξις*, habit of body); *Febris hectica*, *Febris marasmodes*, *Febris tabida*, *ἡσυχία*, *Febris anarctica*, *Febris ampherna hectica*, *Atrophica*, *Tubes*, *Anct. Var.*; *Epanetus hectica*, Young and Good; *Das schleichtende Fieber*, *Hektisches Fieber*, Germ.; *Fièvre Hectique*, Fr.; *Elica Febbre*, Ital.; *Hectic Remittent*, Decline, &c.

289. DEFIN. — Chronic, remittent, or sub-continued fever, with loss of strength and flesh, generally depending upon some evident or concealed source of irritation.

290. This disease is characterised by its slow and insidious approach; its prolonged duration; by emaciation and frequency of pulse; by febrile exacerbations at noon and in the evening, or after a meal, with heat in the palms of the hands and soles of the feet; and lastly, by colliquative sweats and diarrhoea. — The question, as to whether this fever is ever idiopathic, or always proceeds from some evident or concealed local irritation, has been much discussed. The greater number of systematic writers contend that it is occasionally a primary affection, or independent of local lesion. Amongst these are SAUVAGES, SAGAR, LINNAEUS, STOLL, PARR, PINEL, WILKINSON, GOOD, &c.; whilst VOGEL, CULLEN, HENRIKSEN, and others, entertain a different opinion. Believing that it is, in very rare cases, not assignable to any local lesion or irritation, but is owing rather to debility or exhaustion in irritable constitutions, — that, although not a primary affection, it cannot always be attributed to any local lesion, the nature and seat of which can be recognised, — I have introduced it at this place. But, whilst I admit this, I must confess that the arguments adduced by those who consider that hectic is sometimes independent of local irritation, are by no means conclusive. Dr. PRICHAL, in his remarks, published by Dr. GOOD, states that he has seen idiopathic hectic last three months "without any pulmonary affection, and then to break out in the lungs." But the lungs may be diseased for a long time without their functions being manifestly disordered, otherwise than in causing the hectic fever, which may be thus erroneously considered idiopathic. There cannot be the least doubt that various changes may take place in parts possessed of a very great sensibility and imperfect powers of repair, as the parenchyma of several viscera, as the lungs, liver, kidneys, &c., unattended by any

menon which will enable us to recognise their precise seat and nature, and yet give rise to hectic fever.

291. Mr. J. HUNTER contended for its idiopathic existence, by supposing that the constitution may fall into the same mode of action, without any local cause whatever, as proceeds from such cause. This is, however, no argument. He further observes, that nothing is more common than for hectic to exist in patients in whom no local disease whatever can be traced; and that, in such cases, either random suspicions are to be thrown upon the lungs, liver, kidneys, heart, or mesenteric glands, as casual symptoms may suggest, or its idiopathic nature must be inferred. Admitting that there is some truth in this, it should still be contended, that improved means of diagnosis, and a more intimate acquaintance with the origin and relations of morbid actions, have greatly abridged the number of instances in which no local lesion can be detected; and that, instead of this circumstance being common, it is remarkably rare. It is somewhat singular, that the same author, — M. BROUSSAIS, — who has written so ably against the existence of fever as an essential or idiopathic disease, should have produced, in 1803, a work on hectic fever, in which its idiopathic nature is strenuously contended for, and its various forms very minutely described — the least idiopathic of all fevers having been considered by him chiefly as such; — M. BROUSSAIS had, however, not then changed his opinions as to the nature of fever.

292. i. DESCRIPTION. — The early symptoms of hectic are — emaciation with a pale, and often fair, skin; increased frequency of pulse, especially at noon and evening, with some degree of hardness or sharpness; rapid or short respiration on any exertion; and increased heat of skin. — The exacerbations are at first very slight; but they soon become more evident, particularly in the evening; are preceded by a slight or marked chill; are attended by increased heat, which is most evident in the hands and face, the skin being at first dry; and terminate in a free, profuse perspiration, especially the evening paroxysm, which usually subsides in this manner early in the morning. The bowels are costive, but afterwards readily acted upon; ultimately they are relaxed, and colliquative diarrhoea supervenes. The urine is various, but most frequently pale and without deposit; more rarely high-coloured, and with a lateritious sediment. As the disease advances, the delicate circumscribed bloom on the cheek, which was at first only occasional, is more constant and general, especially during the exacerbations; the throat and fauces are red, dry, and irritable; the tongue is often clean, red, smooth, without papillæ, and glazed, and ultimately, with the lips and fauces, is covered by aphthous exudations; the eyes are sunk in their orbits, from the absorption of adipose matter, but are brilliant and expressive, their whites pearly and clear; the whole frame is emaciated, and the temples excavated; the hair falls out; the ankles and sometimes the legs are oedematous; sleep is unrefreshing, feverish and disturbed; and debility with a sense of lassitude is constant, but the patient's spirits are unbroken or even sanguine. At last the diarrhoea and colliquative perspiration become daily more abundant; the respiration short and precipitate; and the debility so

great, that the patient often expires when attempting to speak, or on assuming a sitting posture, &c. During the course of the disease, the sensorial functions preserve their integrity; but sometimes, towards the close, slight delirium occurs. In those cases especially which depend upon organic change in the respiratory organs, there are more or less dyspnoea, cough, and expectoration; the nails become incurvated; the last joints with the extremities of the fingers fusiform, and the expectation of recovery gains strength with the progress of disease. (See TUBERCULAR CONSUMPTION.)

293. MM. BROUSSAIS, FOURNIER, VAIDY, BOISSEAU, COUTANCEAU, and some other writers, have divided hectic into three stages: the first continuing as long as the appetite and strength are not materially impaired, and the remissions are distinct; the second consisting of a small, quick, and frequent pulse, accelerated during the exacerbations, with debilitating perspirations, burning heat of the palms of the hands and soles of the feet, and rapid emaciation; the third supervening with the colliquative diarrhoea, oedema of the lower extremities, extreme emaciation and prostration of strength.

294. ii. The CAUSES of hectic fever are remarkably diversified. — It most commonly proceeds from suppuration, ulceration, chronic inflammation, excessive action, and irritation of a secreting organ or surface; from caries, necrosis, or structural change of osseous parts; and from slow inflammatory action of any part whatever of the frame. It also attends upon various adventitious and malignant productions. But in all these, it is merely a symptom of the extent to which the constitution is influenced by the local change. M. BROUSSAIS has distinguished several varieties of hectic according to the nature and seat of its principal causes; as, the *Gastric*, the *Pectoral*, the *Genital*, *Hæmorrhagic*, *Cutaneous*, *Moral*, &c. HILDENBRAND enumerates the following: the *Inflammatory*, *Putrid*, *Nervous*, *Gastric*, *Atrial*, *Pituitous*, *Vermineous*, *Enteromesenteric*, and *Suppurative*, to which may be added the *Puerperal*. As each of these varieties attaches to itself more or less importance, and as the division adopted by M. BROUSSAIS has been very closely followed by numerous recent writers, I shall offer a few remarks in illustration.

295. a. *Gastric Hectic* is distinguished by anorexia, thirst, dryness of the mouth, prolonged and difficult digestion, and more or less of the usual concomitants of indigestion, especially eructations, flatulence, acidity, cardialgia, &c. Sometimes the appetite is unimpaired, or is even increased, but digestion is faulty. The tongue is loaded, the mouth clammy, and the taste disordered. There are often uneasiness in the stomach, tenderness of the epigastrium, frontal or sub-orbital cephalalgia. The complaint is exasperated by heating food, and the abuse of stimulants, which occasion a sense of heat in the stomach, or pain and cardialgia, with acrid eructations. Ultimately the body becomes pale; the breath foetid; the bowels irregular, or even irritable; and the symptoms of hectic fully developed. In children, picking of the nose, mucous diarrhoea, and occasionally the expulsion of worms, are also observed; and the disorder is almost identified with anorexia

modification of, the remittent of children (§ 270.). This form of hectic is very probably connected, as BROUSSAIS, BOISSEAU, and others believe, with chronic irritation of the digestive mucous surface; but debility, more especially of the organic nervous system, is the primary and most important constituent of the disorder. The hectic sometimes observed to follow lactation, particularly when prolonged, is often of this kind. M. BROUSSAIS has distinguished the connection of hectic with cutaneous eruptions, by the denomination of *Cutaneous Hectic*. But the constitutional disturbance is less the effect of the affection of the skin than of the disorder of the digestive organs, with which the latter is very generally associated as a symptom.

296. *b. Pectoral Hectic* consists of the constitutional disorder consequent—1st, upon inflammation or ulceration of the larynx, and irritation of the epiglottis; — 2dly, upon the various forms of bronchitis; — 3dly, on the several lesions of the lungs; — and, 4thly, upon chronic alterations of the pleura. It should, however, be recollected, that any of the various kinds of pectoral hectic may be associated with gastric disorder; indeed, the advanced stages of the former are always attended by more or less of the latter. Hectic arising from these lesions is fully treated of under the respective heads.

297. *c. Genital Hectic* consists of debility, associated with febrile exacerbations, caused by excessive sexual indulgences, or by masturbation; by irritation and mucous discharges from the sexual passages; and, occasionally, by irritation of the urinary organs.—These phenomena not merely occasion, but also accompany and perpetuate, the hectic symptoms, until other viscera are drawn within the vortex of morbid action; the digestive organs, especially the mucous surface, or the lungs, or even both, becoming also diseased, and ultimately evincing the most prominent affection. The ill-regulated or excessive indulgences and dissipations of youth are often productive of irritation of the sexual and urinary organs, attended by more or less discharge; by debility, febrile exacerbations, and indigestion. If the indulgences which induce this disorder are continued, organic nervous power is prostrated further still; digestion and assimilation are rendered more imperfect; circulation through the lungs more irregular; and ultimately tubercular formations are developed in this organ, especially if the diathesis or other causes conspire with this in forming them.—It is an important fact, and one which is too generally overlooked, that hectic fever, induced either by irritation of the sexual organs, or by disease of the lungs, is attended by a remarkable propensity to masturbation, which counteracts but too generally every means of cure.

298. *d. Puerperal Hectic* is that form of slow fever which sometimes affects delicate females during lactation, and which, if the cause be continued, may superinduce pulmonary disease. It also sometimes follows protracted or excessive lactation, and passes either into pectoral hectic or into a chronic state of debility, with especial disorder of some one of the abdominal viscera.

299. *e. Hæmorrhagic Hectic*, or the slow fever consequent upon loss of blood, is to be attributed rather to the pathological state giving

rise to the hæmorrhage, than to the debility caused by the loss of blood. Hectic, even in its slighter forms, seldom follows large bleedings from wounds; whilst it is a very common sequence of hæmorrhage from the pulmonary and digestive mucous surfaces; for there is generally antecedent disease, either of the mucous surfaces themselves, or of parts intimately connected with them, that sooner or later would very generally be productive of hectic fever, if no hæmorrhage had ever taken place. When hectic follows the suppression or disappearance of hæmorrhages, either occasional, habitual, or periodic, chronic inflammation or irritation of some important viscus, more especially of the lungs, the liver, the uterus, &c., should be suspected.

300. *f.* Some authors have distinguished a form of hectic from *mental or moral causes*.—There can be no doubt, when the mind becomes possessed by a predominating passion or desire, or constantly ruminates on some depressing sentiment, or continually regrets the loss of endearing objects, that the powers of life will gradually languish, and that, in delicate constitutions especially, many of the symptoms of hectic or slow fever will be produced; and, although the mental affection may not induce more than the earlier stage or slighter grade of the disease, in sound constitutions, it will frequently occasion, especially in the weak, and in those endowed with a morbid diathesis, structural change in the lungs and other susceptible organs, owing to the continued depression of organic nervous power which it causes, and to the changes resulting therefrom. Every observer must have remarked the series of changes following the loss of loved objects, disappointed or abused affections, unmerited neglect, &c.; and recognised the influence of the mental impression upon the functions of digestion, assimilation, circulation, and respiration successively, until a predisposed organ—most frequently the lungs, the heart, or the liver—indicated a predominance of disorder and fatal tendency. In these cases, the slighter forms of hectic, the pallor, emaciation, febrile exacerbations, sleeplessness, and debility, advance slowly, and become imperceptibly associated with shortness of breath, dyspnoea, short cough, hectic flushes, and morning perspirations; the lungs very frequently evincing most serious disease. In all instances of this kind, it is important to ascertain the changes more immediately consequent upon the exciting cause. In every case which I have seen sufficiently early, the vegetative or organic functions were in a debilitated or blighted state; the appetite was diminished; digestion impaired; the pulse languid, slow, and weak; the circulation through the lungs imperfect and impeded, as indicated by frequent sighing, and oppression in the thorax; and the impulse of the heart very deficient, or at times either irregular or excessive, as if this organ were labouring to overcome the congestion consequent upon the impeded circulation through the lungs. The tubercles which generally form in the course of these affections cannot be ascribed to inflammatory action, as they originate when the organic nervous power of, and circulation through, the lungs, are most impaired; but are rather a result of these latter pathological states.

301. *g.* As to the other varieties mentioned by HILDENBRAND, a few remarks may be necessary.

—*a. Inflammatory Hectic* is merely that form of symptomatic fever which usually attends chronic inflammation of an internal viscus, or of a deep-seated part.—*B. Putrid hectic* is the fever sometimes attending scorbutic affections, or gangrenous and spreading ulceration, &c.; or arising from unwholesome and innutritious food.—

—*γ. Nervous Hectic* is the constitutional disturbance observed in persons labouring under mental afflictions, &c. (§ 300.), or chronic disorder of the nervous system, and in chlorotic and hysterical females.—

—*δ. Atrabilious Hectic* presents itself in persons long subject to disorder of the liver and other digestive organs—whose portal circulation has become congested or obstructed, their biliary and intestinal secretions morbid, and their digestive canal torpid or overloaded. Such persons are morally and physically depressed; are melancholic and hypochondriacal, sallow, squalid, and thin, are often affected with shortness of breath, colicky pains, disordered bowels, tenesmus, and hæmorrhoids; the stools are dark, fetid, and scybalous, and the abdomen frequently hard or tense.—

—*ε. Pituitous Hectic* is merely a modification of the gastric (§ 295.), attended by pituitous coluvies in the *prima via*, owing to imperfect power of the organic nervous system. It is common in children, and is characterised by pallor, leucoplegmatic indolence, and torpor; swollen lymphatic glands, increased secretion of mucus; tumid abdomen; fluor albus; the collection of viscid mucus on the tongue and teeth; coryza, mucous diarrhoea, and obscurely remitting and slight fever.—

—*ζ. Verminous Hectic* is a modification of the foregoing, or the association with it of worms in the intestinal canal. It is occasionally observed in delicate and relaxed, or rickety, or scorbutous, children; and in those who live in low, damp, close, and unhealthy localities and apartments, and who are subject to chronic bronchitis or winter catarrhs.—*η. The Entero-mesenteric* is a modification of the *pituitous and gastric*, particularly when occurring in children; or is rather the association of enlargement of the mesenteric glands with the affection of the digestive mucous surface, chiefly constituting these varieties. It is hence closely allied to the affection already described under the head of *Infantile Remittent* (§ 278.).—(See also art. *MUSCULAR DYSPEPSIA*.)

302. *h.* The varieties of hectic which arise, from the formation of matter in internal viscera, from tuberculous ulceration, from carious bones, &c., from the irritation of foreign substances, and from chronic inflammation affecting parts possessing a deficient power of reparation, possess general features of resemblance, but vary in the more minute details, and differ not materially from the general description given above (§ 292).

303. *iii.* *PROGNOSIS.*—The duration of hectic varies from a very few weeks to a number of years; but, however long, the tendency of the disease is fatal, unless circumstances occur or medical means be used to arrest its course—unless the causes on which it depends are removed.—The danger is owing entirely to these causes, and is great according to their nature.—In cases of caries, or of other local diseases which admit of removal, the fever disappears soon after the separation of the morbid from the healthy parts. When the disease depends upon the continued or repeated irritation of a secreting surface or gland,

as in its *sexual and puerperal varieties* (§ 297, 298.), and in the chronic forms of bronchitis and diarrhoea, it generally disappears with the cause which produced it, unless serious disease of some important viscus, as of the lungs, has been superinduced in its course. But when chronic inflammation continues to destroy, or to alter the structure of, some vital organ or deep-seated tissue, or when the substance of an internal viscus is in a state of suppuration, or when hectic proceeds from tuberculous formations, recovery seldom takes place. Yet, in some of these cases, the powers of life continue long to resist the progress of disorganisation; and occasionally at last are successful, not only in limiting it, but also in removing the chief of whatever changes had taken place. This is demonstrated in the adhesions of serous surfaces, in the absorption of purulent collections from the substance of internal viscera, or in their discharge, and in the subsequent cicatrization of the parts affected. Both the liver and lungs furnish proofs, although in rare cases, of such occurrences. Even a lobe of one of the lungs may be entirely destroyed by suppuration, and the patient recover. When the cause is obscure, and we doubt whether the disorder is idiopathic or the consequence of some lesion that eludes detection, the patient being young, and vital power not far reduced, hopes should be entertained. But when strength is far reduced, emaciation extreme, and colliquative diarrhoea or perspiration is present, there is little or no chance of recovery.

304. *iv.* *PATHOLOGY.*—*A. The Lesions, post mortem*, consist—1st, of those which caused the fever (§ 294.);—2^d, of alterations of the mucous surface of the digestive canal, upon which the diarrhoea present in the last stage mainly depended;—3^d, of disease of the lymphatic and mesenteric glands;—and, 4th, of redness and inflammatory discolouration of the lining membrane of the heart and large vessels.—The various lesions from which this fever may proceed, require no further notice than has been taken of them in other articles; but those which are evidently consequent upon its early stages, which aggravate it in its course, causing the more severe symptoms characterising its latter periods, are deserving of attention.—The changes in the digestive mucous surface consist chiefly of tubercular depositions, and of ulceration seated more especially in the lower part of the ileum and in the cæcum, with softening, and frequently with superficial redness, of the mucous membrane. The ulcers, however, are often unattended by redness, thickening, or unequivocally inflammatory appearances, and are entirely similar to those described in the article *DIGESTIVE CANAL* (§ 36. *et seq.*). The changes in the absorbent glands are the same as those described in the article *LYMPHATICS*.

305. The lesions of the circulating system have been overlooked, until notice was directed to them by BOUILLAUD, who has given the details of a number of cases of hectic, in which the internal membrane of the heart, and large vessels, both arterial and venous, presented more or less of inflammatory redness; the substance of the heart itself being often soft and flaccid, and atheromatous depositions being sometimes found in the internal membrane of the arteries.—Several years ago, I observed the internal lining of the pulmonary vein, and of its principal branches, of a

dark red and reddish brown colour, in a patient who died with tuberculous excavations in the lungs; and I have seen similar appearances subsequently in two or three cases of this disease. — But whether these appearances are the result of inflammatory irritation induced in the internal surface of the circulating system, or depend upon the action of the blood upon this surface after death, has not been satisfactorily ascertained.

306. *B. Nature, &c. of Hectic.* — Pathologists have supposed that the disease depends upon the gradual absorption of purulent, sanious, or other morbid matters into the circulation; and others have believed that it arises entirely from the local irritation — no such absorption occurring. — It is necessary to keep in recollection a few facts, which will serve to elucidate the matter. — (a) Large excavations, &c. often take place in the lungs without much cough, and with little or no expectoration, but with severe and rapid hectic: absorption, in these at least, must exist to a certain extent. — (b) In such cases, the diarrhoea and night sweats are frequently very great. — (c) In cases, the hectic is also severe in proportion to the evidence of absorption. — (d) The glands in the vicinity of carious, suppurated, ulcerated, or tuberculated parts, often become affected. — (e) Irritation, excessive pain, foreign substances, &c. may long exist in deep-seated or internal parts, without inducing hectic, or causing more than the symptoms of its slighter forms or early stages, as long as these causes do not give rise to morbid secretions in the substance of the affected tissue; but, as soon as matter is collected, or a fluid is formed from the destruction of the surrounding organisation, the usual signs of confirmed hectic appear. — (f) Purulent matters have evidently formed in the liver, and occasioned hectic: the patient has recovered; and, having afterwards died of some other disease, has presented proofs, in the changes observed in this organ, that an abscess had existed in it. — (g) Lesions of the blood-vessels are not infrequent in the advanced stages of the worst forms of hectic, or those caused by tubercles and suppuration. — These facts induce me to infer — 1st, that absorption actually takes place; — 2d, that it proceeds slowly — the depurating viscera, especially the kidneys, bowels, and skin, generally removing the morbid matters, or preventing their accumulation in the blood to the extent of causing very manifest or rapid changes in it; — and, 3d, that the absorbed matters ultimately affect the blood, and not improbably the vessels also in which they circulate. I believe that the diarrhoea characterising the last stage of hectic, is caused as much by the disordered state of the blood affecting the mucous follicles and membrane, as by inflammatory irritation; and that, when this latter condition exists, it arises chiefly from the blood, and the morbid secretion poured out by these tissues. The alteration in the blood may readily be supposed to discolour, or otherwise affect, the internal surface of the vascular system, or even to inflame or disorganise it, in those vessels which proceed from the part which is the seat of caries, suppuration, or of tubercular ulceration. — As to the softening and flaccidity of the heart, upon which M. BOUILLAUD places some stress, I have seen nothing beyond what is presented by other muscular parts in these cases, the heart having partici-

pated in the emaciation or deficient nutrition of the rest of the body. — From these considerations I therefore conclude, that hectic fever is most frequently the result — 1st, of local irritation, of a slow inflammatory kind, either latent or manifest, and generally consequent upon, and associated with, debility; — and, 2dly, of the passage of morbid matters into the circulation, where they occasion most of the severe phenomena uniformly and contingently present in the last stage.

307. *v. TREATMENT.* — The means of cure must have immediate reference to the cause or pathological state on which the hectic depends. — During the first and second stages, they may be often employed with success. But when the third stage has supervened, we can expect nothing from them beyond alleviating the more distressing symptoms. — a. When the disease proceeds from the association of disease of the digestive mucous surface, with debility (§ 295.), the treatment should consist chiefly of strict attention to diet — the farinaceous and easily digested articles of food being selected; of attention to air, gentle exercise, and to the state of the excretions; of gentle tonics conjoined with small doses of ipecacuanha and anodynes; of the infusion of cinchona with the solution of acetate of ammonia, or with small quantities of the nitrate of potash and sweet spirits of nitre, of bitters associated with laxatives, or of emollients with mild narcotics, according to the circumstances of the case. The bitter infusions may likewise be given with prussic acid, or with the extract of lup. When we suspect the existence of alterations of structure, they may be conjoined with the liquor potassae, or BRANDISH'S alkaline solution and conium. If the preparations of *iodine* be tried, very small doses only should be exhibited. A weak solution of the hydriodate of potash, or of the ioduret of iron, is most appropriate in such cases, either alone or with a narcotic, as hyoscyamus, conium, or extractum humuli. (See STOMACH — Diseases of.)

308. *b.* The treatment of the pectoral and laryngeal forms of hectic is so fully stated in the articles on the individual chronic diseases affecting the respiratory organs and passages, that nothing need be advanced on the subject at this place. It is only in the early stages of these forms of hectic especially, that material advantage can be hoped from medicine. The means just enumerated will often be found of service; but they require to be modified according to the peculiar features of the case. Gentle astringents and tonics, mineral acid, &c. are sometimes also useful. Of these, the infusion of roses with sulphate of zinc, sulphuric acid, and narcotics, is most appropriate.

309. *c.* The sexual and puerperal forms of hectic generally soon disappear upon the removal of their respective causes, if serious changes in remote organs have not been superinduced by a continuance of the irritating and exhausting discharges, in which the hectic originates — by the practices inducing and perpetuating the disease. In these forms, the recovery depends much upon the patient himself. Early rising; mental and bodily occupations; low regimen; the avoidance of stimulating beverages, heating foods, and of warm condiments; travelling or voyaging; change of air; and a prudent regulation of the imagin-

ation; are among the most effectual means of cure. Seltzer water, soda water; the mineral waters of Pyrmont, Carlsbad, of Gießenau, of Ems, of Vichy, of Bath, of Tunbridge, &c., are severally useful, if appropriately prescribed. — When the disease is occasioned by suckling, the cure is generally speedy, if the cause is relinquished before an important organ becomes affected; and if a restorative regimen, with change of air, be adopted. In such cases, the *mistura ferri composita*, and chalybeate waters, or the mineral waters just mentioned, are very serviceable.

310. *d.* The treatment of the other varieties of hectic is not materially different from that now stated. — When the disease follows *hemorrhages*, the means of cure should be directed especially to the pathological state of which the hæmorrhage is the result. (See that article.) — If it be connected with *cutaneous eruptions*, the state of the digestive organs, and of the frame generally, ought to claim an especial notice; and if it originate in *mental emotions*, such measures as are the best calculated to divert the mind from contemplating the sources and relations of its misery should be prescribed. — The *atrabilious*, *pituitous*, and *verminous* varieties require the combination of tonics with warm purgatives (F. 557—563. 572—576.), chalybeate mineral waters, and vegetable and mineral deobstruents.

311. *e.* When the irritation and absorption of morbid matter are the causes of hectic, their sources should be removed; especially when they consist of carious bones, diseased joints, puriform collections, &c. But when this indication cannot be accomplished, or when the preservation of a limb requires that every means should be tried, the treatment ought to be directed with the view — 1st, of diminishing irritation; and, 2dly, of counteracting or resisting the contaminating influence of the morbid secretion on the circulation. — The first of these is to be fulfilled by a judicious use of opium, morphine, hop, henbane, hemlock, &c.; — the second, by medicines which support vital energy, and thereby resist the extension of disease, or promote the powers of reparation; as digestible nourishment, dry and pure air, gentle tonics, antiseptics, absorbents, and astringents. These may be variously conjoined, according to the peculiarities of the case — anodynes and narcotics with tonics, and tonics with antiseptics and absorbents. Thus, the infusion of cinchona may be prescribed with muriatic acid and the muriate of morphine; the infusion of cascarilla with the solution of the acetate of ammonia and the acetate of morphine; the tonic infusions or decoctions with the alkaline sub-carbonates, or with the solution of potash, or with the chlorates, and the extract of hop or of hemlock, &c. Camphor may likewise be conjoined with narcotics, in cretaceous and absorbent mixtures. When vascular action becomes much excited, the nitrate of potash, or the muriate of ammonia, may be given with such of the foregoing as are chemically compatible with them; and digitalis or tartarised antimony may be prescribed in the more inflammatory cases, and when the bowels are not irritated.

312. *f.* Various urgent symptoms require to be palliated during the advanced progress of the disease. Great heat of skin will be relieved, and consequent perspiration diminished, by cold or

tepid sponging the surface with equal parts of spirits, of solution of the acetate of ammonia, and of rose water. — *Restlessness* may be diminished by the anodynes already enumerated, or by prussic acid, combined with gentle tonics and refrigerants. Camphor, henbane, and the nitrate of potash, or muriate of ammonia, are the most generally useful in this state, excepting when the bowels are relaxed, when opium, hop, or the extract of poppy should be substituted. When *diarrhæa* supervenes, the pathological conditions to which I have attributed it (§ 306.) should be kept in view, as a treatment founded upon them is the most successful in practice; — we should endeavour, in these cases especially, to counteract the contaminating influence of morbid secretions upon the circulation, and to impart tone to the digestive mucous surface. The means that are calculated to fulfil these intentions, are also restorative of vital power, enabling it thereby to resist the extension of disease. The tonics and narcotics already mentioned (§ 311.) may be employed with these views; or certain of them may be conjoined with the chlorates of lime, potash, or soda; or with Kræosote; or with cretaceous mixtures; or these latter may be given with the compound tinctures of camphor or of opium; or with tonic and astringent extracts.

313. *g.* The Diet and Regimen are most important parts of the treatment of hectic; but they should be varied, or even different, in its different states. In most cases the food should be digestible and moderately nourishing. The milk of asses, or milk warm from the cow, goat's milk or whey, fresh butter-milk, warm milk with one or two tea-spoonfuls of very old rum in it; shell-fish, especially oysters; farinaceous and mucilaginous articles of diet; jellies, particularly those made with Iceland or Carrageen moss; and grapes in considerable quantity; have severally been recommended, and are more or less beneficial, according as they are appropriately prescribed. In most cases, the patient should take very gentle exercise in the open air, when it is mild, and expose himself to the sun and air as much as possible without the contingent risks. In some instances, especially those caused by debilitating discharges, by caries, &c., old wine, especially sherry, port, hermitage, and Burgundy, may be allowed with much benefit; and either old Madeira or sherry may be taken in Seltzer water. It is in such cases, especially, that the mineral waters recommended above (§ 309.) are most serviceable. (See also the articles *ANÆMIA* (§ 55.), *ABSORPTION* (§ 15.), *BLOOD* (§ 143. et seq.), *MESENTERIC DECLINE*, *TUBERCLES*, *TUBERCULAR CONSUMPTION*, &c.)

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XVI. FEVER, CONTINUED. SYN.—*Ποτερίς συνεχής*; *Febris continens*; *F. continua*; *Febris continua continens*, *Burserius*; *Enecia*, *M. Good*; *F. Septenaria*, *Auct. Lat.*; *Anhaltendes Fieber*, *Germ.*; *Fièvre continue*, *Fr.*; *Febbre continua*, *Ital.*

314. DEFIN.—*The changes constituting fever proceeding in one series, frequently with a tendency to exacerbation and slight remission.*

315. i. *Of the Division of Continued Fevers.*—Fever of a continued type are so remarkably modified by the circumstances stated above (§ 43.), by varied combinations of causes, states of constitution, predisposition, and by epidemic influence, each form insensibly passing into the one nearest allied to it, that every attempt at arranging them must necessarily be more or less conventional, and depend upon characters, which, although the more prominent and universal, as respects certain species, yet occasionally disappear, or blend with others distinguishing correlative forms and varieties. Owing to this, circumstance, the divisions of continued fevers adopted by writers have been arbitrary and varied. *SCROLL* arranged them as *Inflammatory*, *Putrid*, *Bilious*, and *Pituitous*,—a division not materially different from that previously made by *SYDENHAM*, *HOFFMANN*, and *BOERHAAVE*.—*CULLEN*, *PARR*, and others distinguished three species—namely, *Synocha*, *Synochus*, and *Typhus*: *J. P. FRANK*, also three—the *Inflammatory*, *Gastric*, and *Nervous*. *RICHTER*, four—the *Inflammatory*, *Nervous*, *Putrid*, and *Gastric*. *BORSIERI*, five—the *Ephemera*, *Simple Synochus*, *Putrid Synochus*, *Slow Nervous Fever*, and *Hectic*. *J. FRANK*, four—the *Typhoid*, *Gastric* or *Bilious*, *Rheumatic* or *Catarrhal*, and the *Inflammatory*: and *HILDENBRAND*, five—the *Inflammatory*, the *Septic*, *Nervous*, *Gastric*, and *Hectic*. *DR. FORDYCE*, in his dissertations, attempted no arrangement beyond that into the *regular* and *irregular* forms. *PINEL*, desirous of giving precision to his descriptions, divided fevers of the continued type, into *Inflammatory*, *Bilious* or *Gastric*, *Mucous* or *Pituitous*, *Putrid* or *Adynamic*, and *Malignant* or *Ataxic*; and has justly considered the plague and puerperal fever as distinct from the fevers belonging to these orders. A nearly similar arrangement has been followed by *BOISSEAU* and *BOUILLAUD*. *DR. WILSON PHILIP* has described only two species—*Synocha* and *Typhus*. *DR. M. GORDON*, three—*Inflammatory*, *Typhous*, and *Synochal* Fevers. *HUFELAND*, four—*Inflammatory Fever*, *Nervous Typhus*, *Putrid* or *Infectious Typhus*, and *Gastric Fever*. *DR. TWEEDIE* has divided continued fever into *Simple*, *Complicated*, and *Typhus*. *DR. ARMSTRONG*, into the *Common Simple*, *Common Conges-*

tive, and *Typhus*: and *DR. BURNES*, into the *Inflammatory* and the *Adynamic*, either of which he believes may be simple, or associated with local inflammation. *DR. ARMSTRONG*, having recanted his former opinions respecting fever, and discarded the influence of infection in causing it, has denied the existence of a synochal or simple inflammatory fever; has considered congestive fever to pass into simple fever, or inflammation, when excitement supervenes; and has argued, that typhus always arises from malaria, is essentially the same disease as intermittents and remittents, and differs from them only in type. The various fallacies into which he has fallen respecting the diseases under consideration, will appear more fully hereafter.

316. *DR. SOUTHWOOD SMITH* has viewed continued fevers, “as one great malady never differing in nature, but in every two cases differing in intensity, and giving rise by these differences to various forms of disease”—that this difference alone is the cause of the different forms it assumes. He accordingly admits only of grades of intensity—the first or lowest grade being *Synochus mitior*; the second, *Syn. gravior*; the third, *Typhus mitior*; the fourth, *Typh. gravior*.

317. This view, as involving fundamental principles of pathology and practice, which, if implicitly followed, would lead to very series results, requires a few remarks. *DR. SMITH'S* position is that continued fever never differs in nature. Now, by the nature of a disease is understood its seat, the tissues affected by it, or the exact pathological condition, whether of vital function or of structure, constituting the malady. If therefore, it can be shown that, in the continued fevers, even of temperate climates, the state of function and organisation are always the same in kind—that the vital manifestations and structures are affected in them all in a similar manner, but in different grades of severity,—it will be conceded that fever never varies in its nature. As this position, however, is merely assumed, without any attempt at ascertaining its stability, it must still be doubted, until either it or its opposite be proved. If we closely observe the mode as well as the degree in which the vital manifestations, in the nervous system, in the muscular system, in the blood and vascular system, &c. are affected, in the various forms of continued fever, and the consequent changes in the various functions and structures, we cannot fail of concluding that, however nearly they all may approximate each other, they differ as essentially in nature as in grade.—What is the difference as to intensity between the continued fevers enumerated above (§ 44.), or even between the epidemics observed at different epochs and seasons, if intensity be the only source of distinction? In the paragraph just referred to, other essential differences, arising out of the prominent affection of particular functions, tissues, and systems, are stated; and from these, as well as from the very distinct and even opposite manner in which the vital manifestations, more particularly the organic nervous power, are affected, the varieties of continued fevers result. If fevers were modified in severity merely, they would be mutually convertible into each other, and either species indifferently would rise from one and the same cause. But no such occurrences are observed; for the nature, as well as the intensity, of

fever varies with the kind and combination of causes producing it. Will infectious typhus communicate simple continued fever, or bilious inflammatory fever, or gastric fever, or climate fever, or epidemic yellow fever; or will these species of continued fever arise from the same cause, and admit of being resolved into grades of intensity merely? No one capable of distinguishing disease ever saw the typhus miasm occasion any of these fevers, nor the causes usually giving rise to either of them produce typhus. Neither of them is convertible into the other, and however closely allied or equally severe certain varieties of each may be, something more than difference in intensity is to be recognised. The causes of each are distinct, the features of each different, the course and duration different, the external appearance and internal lesions different, and yet no difference as to severity or intensity may often be ascertained by the ablest pathologist. Is it to this assumed difference of intensity merely that we are to impute the admitted fact, that, in the very same period or stage, the treatment which is beneficial in the one fever is death in the other,—that large depletions are required at the commencement of one species, and most injurious at the same period of another? The very varied, and even opposite, treatment required in several epidemics, even when the same organs are prominently affected, cannot be referred to grades of severity; for fevers, even of this climate, may be equally violent or severe, and terminate fatally after the same duration, and yet be aggravated, or ameliorated, by opposite measures. The great pathological truth,—which ought never to be overlooked, and without a full recognition of which, in estimating the nature and treatment of fevers, our experience will be worse than useless—will be deceptive, and our knowledge worthless empiric—namely, that the vital manifestations may all or severally, be variously affected by the causes productive of fever—may be lowered or heightened, or otherwise changed; and that these changes, whether as to kind or as to degree, should be made the basis of distinction, in arranging the varieties and forms of fever, and in devising indications for their cure. In the following inquiry, something more than intensity of action will be recognised and made the grounds of arrangement and treatment, inasmuch as each of the several kinds of fever presents characters having stricter reference to the nature, than to the grade, of disorder—to the state of vital manifestation in the several systems and structure—and to the seat and grouping of the predominant lesions, much more than than intensity of morbid affection. The arrangement, therefore, about to be followed, will not materially differ from the sketch already given (§ 44.). But all the kinds of fever here enumerated cannot be treated of under this head; their importance, and, still more, certain peculiarities of character, as well as of the circumstances in which they occur, requiring, conformably with the form of this work, that they should be discussed in separate articles. In considering, therefore, the various kinds of continued fever, those only which are most intimately related to each other will be comprised under this head; the more simple states being first described, and the more complicated and dangerous forms successively reviewed.

318. ii. *Of the Prognostic Symptoms in Continued Fevers.*—*a. The countenance.*—When the expression is serene, confident, clear, and animated, the disease is of a mild and uncomplicated kind; in the advanced stages this state indicates a favourable crisis. If the face is large, injected of a crimson or dark colour, with prominence of the eyes, or is agitated and anxious in the early stages of fever, the morbid excitement and determination to the head occasioning this appearance will speedily exhaust the powers of life, and, in a later period, will soon be followed by malignant symptoms, or fatal collapse. When the countenance is tinged of a yellowish or earthy hue, or is withered-like or sunk, or constricted, and especially if it exhibit distress, or want of serenity and confidence, extreme danger may be apprehended. A full, bloated, waxy, or livid countenance, particularly if it assume a tawny or mahogany tinge, indicates very dangerous congestion and approaching death.

319. *b. External surface.*—If the skin be soft and perfect in its sensibility, its heat not excessive, although augmented; but without a feeling of pungency burning; and if its temperature be equally diffused; a mild attack may be expected. But when the skin is dry and harsh, as if thickened, and the heat is ardent, caustic, or unnatural; if the surface be little sensible, not readily acted upon by rubefacients or blisters; or if vesicated parts assume a dark or black hue; if the heat be ardent in the head or trunk, particularly at the epigastrium, and lowered in the extremities; if the skin be thickened, apparently withered, dusky, dark, or livid in parts, or yellowish, flaccid, tawny, streaked of different shades, livid, or otherwise changed from its natural hue; if it be damp, greasy, puffy, or bloated, or studded with very dark petechiae, vibices, or blotches, or unusual eruptions; or if parts pressed upon show any tendency to gangrene; great depression of the vital powers, with contamination of the circulating fluids, should be inferred, and the danger considered great. The more fluid, however, the spots are, the less is to be feared; and when the black or violet petechiae assume a brighter tint, a more favourable opinion may be formed. Large black or livid spots are often attended by dangerous hæmorrhage from the bowels. Small dusky brown spots, like freckles, are very unfavourable signs. Large livid or dark greenish marks seldom appear till very near the fatal period. (ILLUSTRATION.)—If the skin be covered by warm, general, fluid and copious perspiration, attended by an open or free pulse, a favourable issue may be expected. But, if the perspiration be cold, clammy, scanty, or partial, with a nauseous or disagreeable odour, especially if the pulse be weak, small, very frequent, oppressed, or irregular, there is much danger. The occurrence of erysipelatous or erythematic inflammation in the seat of sores or of abrasions; the breaking out of old ulcers, or the opening of cicatrices; or a foul, gangrenous state of old sores; denote sinking of the powers of life, and a tendency to a dissolution of the textures.—*Emaciation*, when moderate, and in due relation to the duration of the disease, is rather favourable; but, when it is excessive or rapid, it indicates ulceration in the bowels. Little or no wasting, or a bloated and a soft or tumid state of the surface, is very un-

favourable, and, with discolouration, indicates a malignant malady.—The supine position; inability to turn or remain upon the side; falling down in the bed; or the head being buried deep in the pillow, from frequently throwing it back, or rolling it about; are indications of great danger.

320. *c.* The abdomen should be carefully examined, in order to form an idea of the probable state of the stomach, liver, spleen, and bowels. — Tension, oppression, and pain in the hypochondria and epigastrium, indicate predominant affection of the liver, stomach, or spleen; and, if to these be superadded sickness and vomiting, or a sense of internal heat or burning, tumefaction or tenderness, a harsh or caustic heat of the surface of these regions, with a parched skin, great thirst, dark-coated tongue, or great anxiety at the præcordia, a very severe form of fever, which will probably pass rapidly into exhaustion, with various malignant symptoms, should be anticipated. — A tympanitic or distended abdomen; soreness, tension, intolerance of pressure; or a sense of heat or burning; with a hot, harsh, and dusky skin; or with watery, foul, and morbid alvine discharges; or with a dark-coloured tongue; are most unfavourable signs. If any of these be accompanied with irregular or irritable bowels, and the state of the discharges just mentioned, or with mucous or bloody stools, asthenic inflammation, frequently with ulceration, or some equally dangerous lesion of the intestines, is present. If, at an advanced period, or after any of these symptoms particularly indicating disorder of the bowels, very acute pain suddenly occurs in the abdomen, extending from a circumscribed spot, with vomiting, collapse of the features, increased frequency and smallness of the pulse, abdominal distension, tenderness, &c., perforation of the intestines, and its consequences, have taken place.

321. *d.* Anxiety at the epigastrium and præcordia, with intolerance of pressure, depends upon the affection of the nerves of organic life, and serious lesion of the stomach and heart, and accompanies the worst forms of fever. — When attended by great restlessness, it is a most unfavourable sign. It often ushers in, and accompanies, dark, grumous vomiting in malignant and disorganising fevers. — *Singultus* is also often consequent upon this sensation, especially when the stomach, or superior and posterior parts of the liver, or both organs, are much affected. When it appears late in the disease, and has been preceded by pain, or by a sensation of heat or burning at the epigastrium, or by distension, oppression, and tumefaction in the hypochondria, dissolution is generally impending, particularly if the singultus be obscure or suppressed, and attended by anxiety or tension at the præcordia.

322. *e.* Sensibility and excitability vary much in different forms and stages of fever. — During moderate excitement, or reaction, when there is no disorganising tendency in any viscus, these manifestations of life are increased and equally diffused. But when the disease evinces at its commencement, or at an advanced stage, depression of the vital powers, with signs of contamination of the fluids, and tendency to a solution of the vital tone or cohesion of the tissues, the excitability or irritability is evidently diminished, either by the exciting causes, or by previously increased action,

or by both; and, in such cases, it is often unequally manifested, or concentrated in those viscera which are most severely affected. Morbidly increased sensibility and excitability, especially when so great as to give rise to spasms or convulsions, or augmented activity of all the senses, and of cutaneous sensation, are indications of affection of the membranes and surface of the brain and spinal chord, with a tendency to exhaustion, great in proportion to the degree of sensibility displayed. — In many of the forms of fever characterised by severe cerebral affection, followed by stupor, black tongue, low delirium, or coma, the vital manifestations under consideration are suppressed by the cerebral congestion, as well as unequally diffused or manifested. In all such instances the prognosis should be very unfavourable. But, when these vital states seem neither suppressed nor much lowered, nor very inordinately excited, nor unequally manifested, the surface of the body, the senses and nervous system generally, still retaining their susceptibility of external and internal impressions, a favourable issue may be expected. When the extremities are cold or clammy; the skin thick, dry, loose, or hide-like; the countenance sallow or collapsed, with increased or caustic heat at the epigastrium; we may infer the excitability to be unequally manifested; to be diminished in the periphery of the body and augmented in the more central parts, particularly if irritability of the stomach and bowels, with morbid discharges, be also present.

323. *f.* The cerebral functions are more or less disturbed in most continued fevers, and require, as well as the state of the senses, the close observation of the physician. — If the sleep be sound, undisturbed by frightful dreams or sudden startings, unattended by stertor, or moaning, and especially if the patient awakens in a more rational or refreshed state, a favourable issue is indicated. But, in proportion as the sleep deviates from this, are severity of disease and danger to be apprehended. An agitated, unrefreshing sleep indicates increased vascular action in the brain; and this is still more to be dreaded, if there be continued watching. Want of sleep often precedes delirium in its worst forms. Stupor, or a desire of sleep, without obtaining it, indicates great danger. — Violent and furious delirium, or early delirium, with great excitement of the circulation, irritable or rapid pulse, crimson-coloured and injected countenance, prominent eyes, and rending headache, indicate a state of vascular excitement, which will soon be productive of dangerous exhaustion, even if the brain escape immediate or irremediable mischief. — If delirium be attended by convulsions, startings of the tendons, or tremors, the danger is great, and often near. It is not less certain, although somewhat delayed, if followed by profound coma, relaxation of the sphincters, unconscious or involuntary discharges, &c. A mild delirium is not unfavourable when unattended by signs of malignancy, or extreme exhaustion of the powers of life; and if it appear in the advanced course of the disease, and chiefly in the evening. When it follows a state of stupor, it is often indicative of recovery. Very lively or very low delirium, the latter especially, is unfavourable. If the delirious patient states himself to be dying, he is generally right, although there may not be many signs of

danger present. Indifference to death, with an apparent desire of it, and a firm persuasion of being perfectly well, are also unfavourable.

324. *g.* If the eyes be calm, or slightly animated, in the early stages, a mild form of fever may be expected,—at advanced periods, a favourable change has commenced. Agitated, wild, terrified, confused, muddled, painful, prominent, turgid, or suffused eyes, indicate a most severe disease, at an early stage, and great danger in advanced periods, especially if the whites of the eyes become of a dusky or dirty yellow. Intolerance of light attends cerebral excitement; and rolling of the eyes, with a wild, unfixed stare, often precedes severe delirium or convulsions. A dull, sluggish state of the eyes, want of animation, sinking in their sockets, a dark hue of the conjunctiva, with a sad expression, are unfavourable. A pearly whiteness, with agitation and prominence, is a symptom of dangerous congestion of the lungs and liver; and, if succeeded by a dirty yellow hue, or dullness of the cornea, indicates approaching dissolution. Partial paralysis of the retina, indicated by black spots, or other dark objects floating before the eyes; closure or falling of the upper eyelid, or dosing with the eyelids half closed; are dangerous symptoms. — Slight deafness, without pain in the ears, is not an unfavourable sign.

325. *h.* The tongue and mouth furnish important indications in fevers. — In the course of the milder forms the tongue is foul, coated with a yellowish or cream-coloured mucus, and generally furred; it is sometimes a little red at the sides and apex, and rather dry, or moderately moist, in the centre. In proportion as it departs from these states, the danger is increased. If it be covered by a milky, whitish, or mealy coating, and if it be also large, flabby, or swollen, early in fever, an adynamic or malignant state of disease may be expected. If it become rough, dark-coloured, with prominent papillæ, and not particularly coated, but dark red, especially towards the sides, serious affection of the alimentary canal, or of the liver, should be feared; more especially if the symptoms referrible to the abdomen and these viscera be also urgent. If to these appearances be super-added dryness, and contraction of its breadth, serious or fatal changes within the head, or large cavities, have supervened. When the tongue is white, or coated with the papillæ, erect or excited, and the edges red and fiery, vascular action is then inordinate in some internal organ, although no other symptom may indicate this state; and vascular depletions are required. If it be covered by a deep yellow coating, congestions of bile in the biliary ducts and gall bladder are evinced; and if this pass quickly into an excited, dry, and brownish state, the supervention of congestion, or inflammatory action in the substance of the liver, or the digestive mucous surface, or in both, with diminished vital power, may be inferred. A dark or brick-coloured, or livid redness of the tongue, with a glossy surface, or a surface partially covered by a partly detached coating, or black crust, or with a dark, scanty, tenacious mucus in the mouth, or on the teeth, or lips, show extreme prostration of vital power, with contamination of the circulating and secreted fluids. A leaden-coloured, sodden, or parboiled-

like, flaccid, smooth, enlarged, tremulous, or diminished or shrunk, tongue, are all unfavourable signs. If this organ become, in the progress of fever, thickly covered by a dark or fuliginous coating, or exhibit, in addition, deep fissure the apex and sides being of a brownish or dark hue, the adynamic state is extreme, and the digestive mucous surface will readily pass into ulceration or sphacelation, if, indeed, the former lesion have not already commenced. — Vital exhaustion, contamination of the fluids, and solution of the soft solids — the constituents of marked malignancy — are evidently present, if the gum readily bleed when touched, if they and the teeth are covered with a black viscid mucus; if the former discharge a dark dissolved blood, or ichorous bloody sanies; or if a similar fluid escape from the nostrils or posterior fauces. An inky state of the surface of the tongue sometimes ushers in these symptoms, and also evinces the malignant condition. On the other hand, if the tongue becomes cleaner at its edges or apex, or moisture round the margin, particularly if other favourable signs appear, a salutary change has commenced.

326. *i.* Thirst is often very urgent, or even insatiable; but, although indicating the intensity of disease, it is not of itself a dangerous symptom. — The absence of thirst, especially when the tongue and fauces are dry, rough, and parched, is always an unfavourable sign. A constant desire of drink, yet the patient drinking little when it is given him, and a difficulty of deglutition, are very dangerous symptoms.

327. *k.* The evacuations from the bowels furnish important signs to guide the practitioner in the treatment and prognosis. — In the milder forms of fever the bowels are readily acted upon, and the evacuations are generally feculent, but varying in colour and consistence, according to the state of the biliary and other secretions, and the purgatives employed. When the stools give relief from uneasiness in the abdomen, or reduce fullness of it, a mild disease may be expected. If the most active cathartics are required to produce evacuation, the stools being watery, scanty, or otherwise morbid, and voided with a sense of confinement or difficulty, the abdomen being full, or tense, or hot and uneasy, a severe fever may be anticipated, and general or local depletions, or both, are indicated. If copious feculent stools follow this state, a favourable crisis may be looked for. Frequent, scanty, bilious evacuations, presenting every variety of colour, from a light green, or greenish yellow, to a greenish black, sometimes watery, at other times mucous and streaked with blood, occasionally feculent and extremely offensive, often accompany the worst forms of bilious or autumnal fevers, and indicate danger, particularly if they assume a pitchy appearance. When the stools are smooth, dark brown, or blackish, like treacle, the danger is great. When they are intimately mixed with blood, or bloody sanies, or purulent mucus, or are ochrey, very frequent and exhausting organic changes in the mucous surface of the intestines, or in the liver, are evinced. If discharges of blood are found in the stools, especially if unmixed with other matters, ulceration in the large bowels may be inferred. If the

blood be grumous, black, and mixed with the fecal matters, it has generally proceeded from the small intestines. If the stools consist chiefly of a light yellow or serous fluid, or are passed involuntarily or unconsciously, great danger may be apprehended.

328. *l.* The *urine* is always more scanty in fevers than in health, excepting during the premonitory and invading periods, when it is often pale and copious. As reaction is developed, it is diminished, and higher coloured than natural. In proportion to the extent of these latter changes, may the disease be considered as severe.—In the most dangerous forms of fever, particularly those characterised by morbidly increased action, rapidly passing into the malignant or adynamic states, the urine is extremely scanty, and its secretion nearly suspended. If it also present a muddy, or greenish brown, or greenish black hue, great danger exists. A greenish or dark urine is often observed in severe inflammatory, bilious, and gastric fevers, sometimes with a muddy appearance, or with darker clouds in it. When this kind of urine becomes paler, deposits a sediment, especially if it assume a brick colour, and is abundant, a favourable change is taking place. If this secretion become more copious and more natural, with a due deposit, the fever is declining. But if it be more scanty, or suppressed, or passed involuntarily, or if retention occur, extreme danger exists.

329. *m.* The *respiration* is generally frequent or irregular in all severe forms of fever. When it is also attended by a sense of constriction or oppression, or when it becomes short, hurried, difficult, and laborious, or suspicious, great danger is evinced. A still, quiet respiration, the motions of the thorax being scarcely perceptible, is also unfavourable, especially when stupor or torpor is present. A slower state of respiration than natural, occasionally interrupted by deep sighs, or by convulsive heavings of the chest, is a sign of danger. A very hot state of the expired air early in the attack indicates an inflammatory or malignant fever. A coldness or rawness of the expired air, particularly if it have a fishy or otherwise offensive odour, indicates either a malignant disease or approaching dissolution. In all cases of disordered respiration, especially if cough be present, the stethoscope should be used, unless there be any dread of infection.

330. *n.* The *pulse*, to the experienced and observing physician, furnishes the chief indications of danger, as well as of treatment. If it be under 100 or 110, at the same time free, energetic, and regular, the disease will be mild and tractable. But if it rise above the latter number, if it become also irregular, tumultuous, or oppressed, then danger is to be dreaded. If it reach 120, and especially if it rise above this number, the danger is very great. If it mount to 130, recovery seldom or never occurs, unless in cases of hysterical and irritable females, or those in the puerperal state. Smallness, weakness, irregularity, intermissions, or startings of the pulse; or a too open, broad, and very soft pulse, the pulsation ceasing upon slight pressure of the finger; are all indications of great danger. If it become less frequent, more free and expanded, a favourable change may be hoped for. An intermission every fifth or

sixth beat, at the acme of the disease, is sometimes an indication of crisis.

331. *o.* The *blood* taken from a vein furnishes very important indications, both as to the means of cure and as to the result.—If it be not materially different from natural, or if the crassamentum merely slightly cupped, a favourable opinion may be formed. But if the clot be loose, gelatinous or imperfectly separated from the serum; or if it dissolved or broken, and tinge the serum; or if the serum be of a brownish or greenish hue; or if it more remarkable changes mentioned in the article BLOOD (§ 129. *et seq.*) be present; most dangerous disease obviously exists, depending not so much upon the alteration of this fluid than upon depression of the vital manifestations with which it is associated, and of which it is usually the consequence.

332. *p.* The *prognosis*, moreover, depends very much upon the *form of the fever*; at least on the third of the more malignant kinds of fever terminating fatally, according to the usual modes of treating them, and not more than one case in fifteen or twenty of the milder forms.—The *nature of the prevailing epidemic* must be taken into account, in connection with the *circumstances* that seem to favour or extend it. Of these the most remarkable are full living, and a plethoric state of system. Although the epidemic fevers, lately prevalent in Ireland, have been produced by the wretched circumstances of most of the lower classes, and have readily spread, owing to these and other allied causes, the mortality has not been generally great in these classes, in proportion to the number affected; whereas, amongst the higher orders, the extension of fever has been relatively less, but the proportion of deaths to the affected much greater, than in the lower. Persons who live chiefly on animal food, or who partake of it very largely, are in greater danger from continued fever than those who live abstemiously, or chiefly on vegetable diet.

333. *q.* The *age and strength* of the patient should also be taken into the calculation.—Early age and strength do not furnish the protection from fever, nor yet from an unfavourable termination, that is very generally supposed. Indeed, in some malignant fevers, the young and strong are placed in the greatest jeopardy; as in epidemic yellow fever and plague. The continued fevers of this climate are most prevalent from the fifteenth to the thirtieth years. The proportion attacked during this period may be reckoned, as to the other periods of life, as three are to two; whilst the number of deaths in the former, compared with the latter, may be considered as ten to nine; showing that, although the predisposition to fever is greatest at this particular period, the danger is somewhat less.

334. *r.* *Sex* has but little influence as to the prognosis of fevers in this country. But, in warmer and more unwholesome climates, and in certain epidemics, it should have considerable weight.—In fevers proceeding from infection, marsh exhalations, and suppressed perspiration, and in various epidemics, a larger proportion of males is generally attacked, owing chiefly to the circumstance of their being exposed more than females to those causes. The latter are, also, upon the whole, less severely affected, owing—1st, to their much less exposure, and the consequently less intense

action of the causes; — 2dly, to the less rigidity of their fibres; — and 3dly, to the periodic discharges to which they are subject.

XVII. FEVER, ARDENT; *Febris Ardens*. CHARACTER.

— *The stages or series of febrile phenomena proceeding with rapidity and regularity; the period of excitement being very acute, and attended by greatly increased vascular action; no morbid seminum or infectious miasm being generated in their course, as observed in modern times.*

336. Under the generic denomination of *Ardent Fever* may be comprised those more acute forms of fever which are attended by great vascular excitement, and which, owing to their nature and severity, generally run their course in from one to fourteen days, and are but seldom prolonged beyond nine or eleven days. They may be divided into the more ephemerel and the inflammatory

EPHEMERAL FEVER. SYN. — *Diary Fever*, *Febricula*, *Ephemera*, *Febris diaria*, Auct. Var.; *Simple Fever*, FORDYCE; *Das eintägige Fieber*, Germ.; *Fièvre éphémère*, Fr.; *Effimero*, Ital.; *Efemera*, Span.

337. CHARACTER. — *Increased frequency and strength of pulse; with heat of skin, headache, thirst, and white excited tongue; terminating in perspiration generally within twenty-four hours.*

338. *Simple Ephemerel Fever* may occur in a very mild and slight form, — the *Ephemera mitis* of Dr. GÖÖN; or in a much more acute state, — the *E. acuta* of this writer. But intermediate grades between these may also present themselves.

339. A. Causes. — *The mildest variety is usually caused by excessive or prolonged muscular exertions; by the more violent passions and emotions of the mind; by protracted study and mental occupations or excitements; by vicissitudes of temperature, and exposure to a warm sun; and by disorder of the digestive organs, proceeding generally from the quantity and nature of the ingesta. — The more acute states usually arise from the above causes, from a surfeit, from temporary obstruction or congestion of the biliary organs, from the presence of fecal collections and morbid excretions in the prima via, and from violent exercise under a hot sun.*

340. B. Symptoms. — a. *The milder form of ephemerel fever is rarely preceded by chilliness or rigors; but it generally commences with lassitude, yawning, stretchings, and a sense of irritation or of undue excitement. The pulse becomes frequent, the skin hot, and the head pained. The patient tosses in bed — is restless; cannot sleep, or sleeps in a very disturbed and interrupted manner; and his tongue and mouth are dry. These symptoms frequently commence in the afternoon or evening, and subside, in the course of the succeeding morning, in a gentle perspiration; thus terminating in from eight to fourteen hours. But often, also, when the cause has been more severe, and the disorder has come on at a later hour, the patient continues feverish in the morning after a restless night, is indisposed to leave his bed; feels unrefreshed, and unable to make any exertion; and passes the day in disquiet. Towards evening, the restlessness and other febrile symptoms increase; but in the night, or at an early hour in the morning, he falls into a quiet sleep; a perspiration breaks out; and he awakens refreshed and restored.*

341. b. *The more acute form often begins — especially when it is caused by disorder of the digestive organs, or by cold — with chilliness or rigors, succeeded by great heat of skin and throbbing pain of the head. The pulse is frequent, strong, and full; the face is flushed; the urine high-coloured; the tongue is white, the papillæ erect; and the secretions and excretions are diminished. These, and the usually attendant symptoms — as restlessness, languor, want of sleep, and general uneasiness — having continued from twelve to twenty-four hours, a free perspiration supervenes, generally towards morning; the urine deposits a sediment; and the disorder disappears. When this form of fever proceeds from mental emotions or excitement, and from exposure to a hot sun, or from muscular exertions in warm weather, or from a rapid transition to a hot climate, it is seldom or never preceded by chills or rigors, and, if not actively treated by antiphlogistic remedies, often prolonged beyond the period just mentioned, and assumes all the characters of the next species — *Inflammatory Fever*.*

342. C. Diagnosis. — *These states of disorder may be mistaken for the commencement of some one of the more serious forms of fever. But they may readily be distinguished by ascertaining their causes; by the absence of the usual premonitory signs of fever; by the sthenic and acute vascular excitement, nervous energy being very little impaired; by the rapid increase of the heart's action; by the slight depression of the muscular powers; and by the circumstance of pain being either hardly complained of in the loins and limbs, or altogether absent.*

343. D. Treatment. — *The febrile symptoms soon subside after the digestive canal is freely evacuated, especially when they have arisen from the irritation produced by retained excretions. When they are caused by the ingesta, an emetic should be given immediately, and its operation promoted by the usual means; but it is contra-indicated in all other cases. Afterwards a dose of calomel ought to be administered, and allowed to act upon the secretions for five or six hours. Cooling saline purgatives, conjoined with small doses of antimony, or of ipecacuanha, as advised by VATER and GIANELLA, or of the spirits of MINDEBERG, repeated at short intervals, will then hasten recovery, and remove the morbid secretions which have disposed the frame to these febrile attacks. — When the disorder has been occasioned chiefly by atmospheric vicissitudes, diaphoretics, especially after the bowels have been freely evacuated, and a tepid or warm bath, are more particularly indicated.*

344. If the febrile attack have been caused by inordinate mental excitement and exertion, or by fits of passion, by anxiety or other affections of mind, cold should be applied to the head, in the form either of affusion, of cold water, cold sponging, evaporating lotions, &c.; the bowels freely evacuated, and diaphoretics prescribed. — If it be produced by exposure to, or by muscular exertions under, a hot sun, and whenever vascular action is excessive, or the patient plethoric, full bloodletting ought to be practised previously to the last specified means, which should be assiduously employed, and accompanied by cold sponging of the surface, and the internal use of refrigerants and saline medi-

cines. The febrile attacks which follow exposure to the sun in warm climates, or even the quick transition from a cold or temperate to a hot country, when treated thus actively at their commencement, generally subside within twenty-four hours. But it is comparatively rare that a seasoning or climate fever runs its course in so short a time, unless in delicate or thin persons, and when the attack is very slight. In these cases, particularly when the stomach is irritable, much benefit will accrue from the frequent exhibition of small doses of the nitrate of potash, or of it and the muriate of ammonia, in solution, as prescribed by HILLARY, nearly as follows:—

No. 921. Potassæ Nitratis gr. xx.; Ammonię Muratis gr. xij.; Mist. Camphoræ 3vj.; Aquæ 5x. Misce; fiat haustus, quartis vel sextis horis sumendus.

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ii. INFLAMMATORY FEVER. SYN.—*Καύσος*, Πιρροκρατος; *Σύνσχος*, *Συνήχης φλεγμωδὴς*, Græc.; *Synochus Imputris*, Galen; *Febris Sanguinea*, Avicenna; *Synocha Biliosa*, Sennert.; *Febris septennaria*, Plater.; *Synocha simplex*, F. *acuta Sanguinea*, Hoffmann; *Febris continens vel Synocha*, Stahl; *F. continua non Putrida*, Boerhaave; *Synocha simplex*, Juncker; *Febris Inflammatoria*, Stoll; *F. Inflammatoria simplex*, Huxham and Hildenbrand; *Synocha*, Sauvages, Cullen, &c.; *Febris continua Inflammatoria*, J. P. Frank; *F. continens Inflammatoria simplex*, Selle; *Febris Sthenica*, Brown; *Enecia Causa*, M. Good; *Dynamic Fever*, Stoker; *Calentura continua*, Span.; *Fiebre Antioténique*, Pinel; *Fiebre Inflammatoire continue*, Fr.; *Synoshische*, *Entzündliche Fieber*, *Entzündungsfieber*, Germ.; *Febbre Inflammatoria*, Ital.

345. DEFIN.—Pain in the head, back, and limbs; heat generally and greatly increased; pulse full, hard, and accelerated; thirst urgent; urine in small quantity and high coloured; the bowels constipated, with restlessness and anxiety.

346. A. CAUSES.—a. Disposition to, and predisposing causes of, inflammatory fevers.—If we view these fevers as affections of the vascular system chiefly, we may impute the disposition to become affected by them to the high irritability of the heart and arteries. As respects symptomatic fevers, this explanation may be conceded, inasmuch as the irritability of the different parts of the vascular system is derived from the same source, namely, the ganglial nervous system; and as all causes of irritation, which act with sufficient energy, relatively to the state of irritability, upon a single part of the system, affect the whole.—I here refer the operation of the irritating causes to the state of the irritability because their action is merely relative: therefore,

where the susceptibility to irritation passes beyond the usual standard, slighter causes will induce inflammatory and symptomatic fevers, than when it is either below or at the natural state. The condition of the irritability may vary not only in different individuals, but also in the same person at different epochs of life, and in the different organs of the body; the irritating causes thus exciting a relative action on different individuals, on the same person at different periods, and on the different viscera. But, although the disposition to be attacked by inflammatory and symptomatic fevers depends greatly upon the state of irritability, yet the disposition to be seized by other continued fevers does not appear to arise from the same circumstance. Indeed we perceive that increased irritability of the vascular system has little or no influence in favouring the operation of the exciting causes of several continued fevers; and that other manifestations of the living organisation, besides this, dispose more remarkably to them.

347. The predisposing causes of inflammatory fevers consist, first, of high irritability and tonicity of fibre, more especially when conjoined with vascular fulness and imperfect performance of any of the secreting or excreting functions—of an inflammatory diathesis, or of rude health, or of a gross habit of body;—second, of those states of season, climate, or atmosphere, which tend to produce this diathesis.—Hence these diseases occur chiefly in young adult men; in the plethoric, florid, and robust; in persons of a sanguine and irritable temperament; in those who have experienced the suppression of an accustomed evacuation, or who live fully and richly, or intemperately, or who pursue healthy occupations in the open air, or who habitually take invigorating exercise: and they are most prevalent in cold and dry, or very warm and dry, seasons and climates; in highly elevated localities; and amongst mountaineers, sailors, soldiers, and persons living in the country.

348. b. The exciting causes are—(a) Whatever directly stimulates, in an inordinate manner, the nervous and vascular systems; as, change of climate, especially migration from cold or temperate, to very warm, or dry, countries; exposure to the rays of a warmer sun than has usually been experienced; exercise in the sun's rays; the influence of dry winds; and very dry and cold states of the air; sudden vicissitudes of weather or of season; the accumulation of electricity in the frame; a heating or very full diet, warm condiments or sauces, and stimulating liquors; change from a low to a rich or full diet; the intemperate use of wines or spirits, especially in connection with atmospheric heat or vicissitudes; great bodily exertion; violent mental excitation and emotion;—(b) Whatever indirectly induces great excitement or vascular reaction; as, the impression of cold when the body is overheated and perspiring; sleeping on the ground, or in the open air, especially when exposed to the night dews, or to the moon's rays, particularly in warm and intertropical countries; the operation of marsh effluvia or malaria, especially under similar circumstances, or after intemperate indulgences; an overloaded state of the digestive organs, and obstruction of the excretions.

349. c. The chief causes of the varieties of this fever, which attack Europeans after their mi-

gration to warm climates, are—their early age, plethoric habits, and phlogistic diathesis; inattention to their bowels during the passage, and their use of salt provisions and spirituous or vinous liquors; increased intemperance, and incautious exposure to the sun and to the night air; excessive fatigue, or alternations of indolence and great exertion; and suppressed perspiration. Dr. JACKSON remarks that persons thus circumstanced rarely escape an attack of fever during the first year of their residence in a tropical country; and that the fevers that occur from these causes are often of the most aggravated kind, and rapid in their course, more especially among troops crowded in barracks or transport ships, where the heat of the climate is augmented artificially; the excess of heat influencing the febrile form, increasing the violence of the symptoms, and retarding the progress of recovery.

350. A question has arisen, as to whether or not the inflammatory states of fever in warm countries are caused by malaria, or by the other causes now instanced. There can be no doubt that malaria very frequently produces, in the plethoric, young, and robust, who have recently arrived in a hot climate, fever of an inflammatory and continued kind. But it must also be conceded that this fever chiefly occurs, even in persons thus constituted, during the dry season, and at times and in places where the existence of malaria is doubtful, or, at least, by no means proved. It is notoriously admitted that the inflammatory states of continued fever, in both the East and West Indies, appear among those soldiers, sailors, and civilians, who have not been long in a warm country, and who have not suffered from disease since their arrival; and that they take place chiefly during the dry and warm seasons, and in situations where the usual effects of malaria are never observed. This is the result of the experience of JACKSON, ANNESLEY, BOYLE, TWING, CONWELL, and of other experienced practitioners in warm countries. It agrees with my own observations; and is even admitted by Dr. FERGUSON, who has gone much further than any one else in assigning malaria as the cause of intertropical fevers. I believe that the other causes assigned above (§ 346—348.) will, in these countries especially, produce fever of an inflammatory or bilio-inflammatory kind, in unacclimated Europeans; but that, when those causes are not associated with malaria, the fever resulting from them will generally subside, under judicious treatment, without evincing those dangerous symptoms which characterise fevers proceeding chiefly from terrestrial exhalations. Although some of the causes, especially those which relate to atmospheric temperature and climate, are very different as to their nature and action, yet they are mainly instrumental in producing fevers having many common features, but differing in severity and duration.

351. B. FORMS.—a. MILD INFLAMMATORY FEVER.—a. The fever which usually arises from cold and dry states of the air, in cold climates, in elevated situations, or in temperate countries, from atmospheric vicissitudes or other causes, assumes either simple or complicated forms, and is generally sporadic. Its epidemic occurrence is comparatively rare, especially in its simple state. It appears chiefly during winter and spring, or during north and north-east winds. In its com-

plicated states, which are most frequent, it forms a connecting link between idiopathic fever, and visceral inflammation; the local affection appearing in the early or advanced course of the former, the general disorder, or symptomatic fever, being consequent upon the latter. Thus inflammatory fever, and local inflammation, arise most frequently from the same causes acting upon different constitutions, habits of body, and states of local or general predisposition;—the simple form of inflammatory fever appearing in the young, plethoric, and robust, and in those possessed of no local predisposition; the complicated form taking place in persons whose previous ailments, habits of life, or avocations, have induced a disposition to predominant action in some important viscus, or from a concurrence or succession of external causes tending to the more especial disorder of one or more organs; and the primary local inflammation occurring from a predisposition of some part so great as to experience the onus of morbid action from the commencement, or soon after the impression of the exciting causes, or from the kind and concurrence of these causes.—In the first case, the whole frame seems to participate equally in the disordered action from the beginning: in the second, the disorder is also general from the first, with predominance of it evinced in some organ, either at a very early period, or in some advanced stage: in the third, the earliest symptoms of disease are referred to a particular viscus, and with the increase of such disease the whole system sympathises.

352. B. The symptoms of this variety are uniform in kind, but vary in severity. The premonitory signs are usually slight, or of brief duration. Hence the attack seems sudden, and is commonly ushered in with rigors or chills which are of short continuance; and, although often well marked, are occasionally so slight as to escape observation or recollection. The rigors or chills seldom recur, and are rapidly followed by general vascular reaction: the skin and integuments become full, injected, dry, hot, and burning; the countenance full glowing or red, and animated; the eyes injected, intolerant of light, but lively; the pulse frequent, strong, bounding, and full, sometimes hard or oppressed; respiration is frequent, and the expired air hot; the nostrils and mouth are dry; the tongue white, its papillæ excited or erect; and the lips full and red. The external appearance of the body evinces increased vital action; the whole surface appears glowing and animated; the internal sensations indicate generally increased vascular activity; and all the secretions and excretions are diminished or obstructed. The patient complains of great thirst and heat; of a severe or throbbing headache and vertigo; of anxiety at the præcordia; of increased sensibility, especially in respect of light and noise; of restlessness, watchfulness, and of frightful dreams; and of nausea or sickness. Taste and smell, owing to imperfect secretion on the surface of the organs, are impaired or abolished. The pulse seldom reaches 110 beats in a minute; and the heat of skin, although greatly increased, is in due relation with the activity of the circulation; and does not impart the harsh and unpleasant sensation to the hand of the observer, that characterises the more

unfavourable kinds of fever. Upon issuing from the vessel, the blood is usually red or florid, viscid, and thick; and separates perfectly into serum and coagulum: the former of which is limpid, watery, and in small quantity; the latter firm and sometimes cupped, but it seldom exhibits the buffy coat unless local inflammation have supervened.

353. The symptoms commonly increase in severity: the tongue becomes red and dry; the urine more scanty, and of a higher colour; the bowels more constipated, and the watchfulness more prolonged. In children, heaviness, drowsiness, or sopor, is frequently observed; and in adults, delirium or reverie sometimes occurs. All the phenomena usually are exasperated in the evening; their mitigation in the morning being attended by partial perspiration, or a relaxed, moist, and warm state of the surface. On the third or fifth day they reach their acme. At this period they often appear somewhat mitigated; but generally continue from two to four days longer, with manifest efforts at a critical change, which usually takes place about the seventh or ninth day, and rarely later than the fourteenth. The crises commonly observed are—hæmorrhages from the nostrils or from the hæmorrhoidal vessels, more rarely from the uterus; a copious and general perspiration; and a free secretion of urine, depositing a sediment. After the natural evolution of one or more of these evacuations, the symptoms rapidly subside, and convalescence speedily advances.

354. Although the *epidemic* occurrence of this form of fever is rare, instances have been recorded by INGRASSIAS, HOYER, HEISTER, VAN SWIETEN, and NAVIERS. In these, the symptoms and progress of disease coincided entirely with the description just given. — Bloodletting, and the rest of the antiphlogistic regimen, were adopted in these epidemics, and recovery took place in nearly all the cases.

355. *γ*. This fever may be said to be *endemic* in warm countries, during dry seasons, especially amongst Europeans who have recently removed to, or who reside in, these countries. But in them it frequently either assumes a severer form than that now described; or, after an imperfect effort at crisis, subsides into a state of dangerous collapse. *Relapses*, also, from errors in diet, or from intemperance and premature exposure, are much more common in them, than in persons residing in northern and temperate climates, generally owing to the concurrence of malaria in producing the fever, which, however, more usually assumes the form noticed hereafter (§ 366.). — Mild inflammatory fever is seldom protracted beyond seven days, unless it assume an unfavourable and complicated form. The continued fever, which occurs, during the hot and dry season, in the more southern parts of Europe, in the East and West Indies, and in other places within or near the tropics, particularly among the natives of cold and temperate countries who have recently removed thither, is generally either of this kind, or of the complicated or severe forms about to be described. The modifications it presents in different climates, result chiefly from the difference in the constitution and habit of the affected, from the intensity and concurrence of the causes, and from the association of malaria

with high grades of temperature, and the other circumstances already insisted on.

356. *δ*. The *complicated states of inflammatory fever* are more common than the more simple form, whether observed in warm, or in temperate and cold, regions. They depend chiefly—(a) on the season and climate;—(b) on the habits and occupation of those affected;—(c) on the concurrence and succession of the remote causes;—and, (d) on the previous state of particular organs.—They generally appear sporadically; occasionally they may be said to be epidemic; and in some places they are endemic.—Their *epidemic* appearance is chiefly in temperate countries during dry and hot seasons, and to a limited extent. Their *endemic* prevalence is observed under the circumstances assigned above (§ 355.). The complications may be either almost cotaneous with the development of the fever, or consequent upon it, at any period of its course. They may be either so slight as to constitute merely an exalted affection of a certain organ, or a determination to particular parts; or so severe as to amount to a state of sthenic inflammation, rapidly passing into disorganisation.

357. (a) The *complication with predominant action or inflammation in the brain or its membranes*, occurs principally in very hot climates, in soldiers and sailors who have been exposed to a powerful sun, and been required to make considerable bodily exertion when thus exposed; in persons who have been intemperate, or have felt the exciting passions of the mind; and in those who have over-exerted their intellectual powers. In these, the fever is often very sudden in its attack; and the symptoms referable to the head indicate every grade of affection, from active determination of the circulation to this part, to fully developed inflammation. In many of such cases it is difficult to determine whether the local or the general affection is the primary one, so early has been their co-existence. In these, the patient sometimes falls down from the suddenness and severity of the affection, with a red or tumid countenance, injected or suffused eyes, and hot scalp, but without loss of consciousness. In others, predominant disorder in the head appears only in the advanced progress of the fever; the patient complaining of severe throbbing and distracting headache, and of a feeling as if the cranium would burst from internal distension. In either case, violent delirium, or maniacal excitement, often supervenes, and rapidly passes into coma, or stupor, or is removed by treatment. In all; the secretions and excretions are impaired, and the bowels constipated.

358. (b) *Predominant affection of the lungs, or pleura*, forming the pulmonic complication, is observed chiefly in cold or temperate climates during dry and cold seasons, and high winds, and in elevated situations. In intertropical countries it occurs only in the cooler seasons, and in elevated localities. Sudden vicissitudes of temperature, damp clothes, and exposure to the night air, after experiencing heat and fatigue, are the most common exciting causes.—The affection of the lungs is frequently either not fully developed, or is latent at the commencement of the fever, and is, consequently, often overlooked after it is established, unless it extend to the bronchi on the one hand, or to the pleura on the other; and then

the symptoms characteristic of either will direct attention to the complication. The stethoscope should therefore be employed whenever the breathing is laboured or oppressed in the inflammatory states of fever observed in the circumstances just stated. — This fever may present also prominent *Hepatic, Gastric, and Enteric disease*; but, in such cases, it will very nearly resemble the forms of fever described under the names *gastro-bilious and mucous*.

359. *b. SEVERE INFLAMMATORY FEVER.*—The disease described by the names of *Synochus Causoides*, by GILBERT; of *Synocha Causodes*, by MANOET; of *Synocha Ardens*, by SAUVAGES; of *Endemic Causus*, by MOSELEY; of *Inflammatory Endemic*, by DICKENSON; of *Climate or Seasoning Fever*, by several writers; and of *Endemic Yellow Fever*, by others; differs from the foregoing or mild form of inflammatory fever (§ 351.) only in grade, as insisted on by JACKSON, and proved by my own observation. This is the disease which most frequently attacks new comers into the West Indies, more especially sailors and soldiers; and which has, as already stated (§ 244—247.), been confounded by recent writers with the aggravated forms of bilious fever on the one hand, and with epidemic or pestilential-yellow fever on the other. It was also prevalent during the last war among the British troops and sailors in the Mediterranean, and was described by BURNETT, IRVINE, BOYLE, BRUNTON, DOWN, and others; but it generally assumed a milder form than in the West Indies.

360. Whilst the milder form of inflammatory fever is common among the white and assimilated European population of warm climates, the *severe or aggravated form* occurs among those who have more recently arrived in them, and more especially among the young, the intemperate, the robust and plethoric, and those who are exposed to the sun, to very high temperature, and to the night air. In most warm climates terrestrial exhalations are also frequently more or less concerned in the causation of the continued as well as of the remittent types of fever: the type being determined, as shown above (§ 43.), by the nature, intensity, and combination of the causes; and by circumstances peculiar to the patient, particularly the novel, or the habitual, operation of the endemic influences to which he is exposed. But, although malaria may be a concurrent cause of this fever, especially in respect of persons who have recently arrived in the West Indies, yet I believe that, where its operation is most unequivocal, the kind of fever produced by it is different from this,—premonitory and cold stages preceding reaction, which is much less violent than in this, the resulting fever being of the bilious continued form, about to be noticed. — My experience fully accords with the observation of Dr. STEVENS, that, when a young Northern stranger is subjected soon after his arrival in the West Indies to the higher ranges of temperature, his clothes are soon drenched; and that, if he be exposed to a current of air in this state, the cold produced will constrict the vessels of the skin, and prove the exciting cause of fever, which, in favourable circumstances, will often be the mild form of inflammatory fever such as has been described above, and as is often observed in temperate climates. The causes which produce a severe affection in young and plethoric strangers, seldom affect the older residents, and

never the natives of the country or the dark races. Women and children, the aged, and the weakly, are much less liable to it than the robust and plethoric.

361. *a.* The history of this form of fever has not been given with the requisite precision by the various writers on it; most of them having mixed it up, in their descriptions, with the inflammatory varieties of remittent, and with the more continued states of fever produced by terrestrial or vegeto-animal exhalations, concomitantly with the other causes of intertropical fevers. — The aggravated form of inflammatory fever is seldom preceded by very marked premonitory symptoms. The attack is usually sudden. Giddiness, faintness, and general uneasiness, sometimes, however, precede it for ten or twelve hours.* There is, occasionally, a slight and brief chilliness at the commencement, especially in the less violent cases, rapidly followed by a sense of universal heat; by flushed face, frontal headache, and vertigo; by inflamed, heavy eyes, and great sensibility to light and sound; by pain in the occiput, neck, back, and limbs; and by a strong, full, hard, and accelerated pulse. A sense of heat, oppression, pain, or anxiety, is felt at the præcordia, sometimes with a dry cough, and pain in the side; respiration is quick, laboured, suspirious, or anxious; the tongue is white, excited, and its edges red; the fauces are arid, thirst urgent, and skin hot and dry; the urine is scanty, the bowels costive; and there is generally nausea, but seldom vomiting until some time after the attack. If the disease be not mitigated by treatment, the patient becomes extremely restless; the headache is rending and intense; vascular action is excessive; and the heat very great. Vomiting now supervenes, and follows the ingestion of whatever is taken to allay the urgency of thirst. The matters thrown off are

* Dr. MOSELEY states, that there is a small degree of chilliness and horror, but never a rigor. Dr. JACKSON remarks that there is more or less of horror and shivering, but the cold is rarely great: Mr. DICKENSON, that there is increased excitement from the commencement, and that a slight chilliness at the onset is observed only in the slighter cases (§ 351.). Dr. STEVENS observes in several places, that there is no cold stage at the beginning; and Dr. BRUNTON, that languor, debility, and oppression are complained of, with chilliness. — This discrepancy in the account of the commencement of a most dangerous disease, and on a point so necessary to a knowledge of its pathology, may be in some measure explained. Dr. JACKSON has described this form of fever in connection with the more inflammatory states of remittent, from which it is perfectly distinct. The description of the other writers is more correct; for in several cases, in which I had an opportunity of observing the commencement of the disorder, no rigors, and hardly any chills, were remarked. Even some of those who complained of chills presented a warmer state of skin than natural. The pure climate fever I, therefore, infer does not commence with shivering or rigors; and seldom with chilliness, unless currents of air, cold, &c. have been concerned in causing it by suddenly checking the perspiration. But the continued fever attended with high vascular action, arising from malaria and atmospheric heat and vicissitudes, that is frequently met with in warm climates and in hot seasons, is commonly preceded by manifest premonitory symptoms, and by a cold stage. These two diseases, which frequently resemble each other very closely, have been generally confounded with one another, more especially as they are observed in the West Indies. Nor should this be a matter of surprise, inasmuch as that very many of the instances of fever which present themselves to men in the public services, as well as in civil life, arise from a combination of malaria with climatorial influences, and that the cases which are produced by a concurrence of such causes are perhaps more numerous than those which spring from either alone — from marsh exhalations on the one hand, or from high temperature and its vicissitudes on the other.

generally tinged with bile; and a bilious yellow suffusion of the skin is frequently observed. Bilious vomiting and purging occasionally occur with the yellowness of the surface, and, in the slighter cases, become a favourable crisis. There is often great drowsiness, but no refreshing sleep. These symptoms of excitement proceed with various degrees of intensity, and occupy a period of from twenty to forty hours, but most commonly from twelve to forty-eight hours. During this period blood taken from a vein is remarkably florid, warm, and fluid. The fibrin coagulates firmly, but the crassamentum is without crust, and is rarely cupped.

362. *β.* The excitement, having reached its acme, is quickly followed by exhaustion. This is indicated by a subsidence of the most urgent symptoms: the pain and heat are lessened; the skin becomes damp or clammy; and the patient has a sense of cold or slight chilliness. This delusive remission is a state of great danger: in some cases, it passes into rapid sinking—into a speedily fatal collapse: but, more generally, irregular determinations of blood, or indications of especial lesion of particular parts, are evinced before death ensues. With the diminution of heat and pain, the pulse falls; the countenance becomes anxious and distressed; the eyes sunk, the pupil dilated; vomiting continues without intermission, especially if the cerebral affection has abated; sometimes delirium is present, at others there is great insensibility or tendency to coma, and in these cases the stomach is more tranquil.

363. *γ.* *Discolouration* of the skin generally takes place in this stage, appearing as yellow, yellowish brown, and livid patches. It never occurs in the period of excitement, for it is quite dissimilar from the bilious yellowness occasionally observed in that period. It is commonly attended by passive hæmorrhage from the nose, gums, eyes, ears, &c., and by black and grumous vomiting. The change of colour, and hæmorrhage, proceed from exhaustion of the vital influence in the extreme vessels, and from the changes induced in the mass of blood. The matters thrown off the stomach consist at first of ingesta and serous fluid, often coloured by bile. In a more advanced stage they are ropy, mixed with numerous small shreds, flocculi, or films, which soon acquire a dark brown, purple, or black colour; but do not, at first, communicate much of the same tint to the fluid containing them. Afterwards the matters vomited are more intimately mixed, and from dark-coloured blood which has been poured into the stomach, vitiated bile, and other morbid secretions, assume a dark or coffee-ground appearance. At the same time, dark-coloured matter, resembling tar mixed with black blood, is freely discharged from the bowels.

364. The other symptoms characterising this stage, and preceding dissolution, are—soft, quick, intermitting, or irregular pulse; clammy, cold, or partial sweats; deep and heavy respiration; coldness of the extremities; black urine, or suppression of urine; singultus, convulsive sighs; tremors and subsultus tendinum; faltering speech: low muttering or raving delirium; strugglings to get up in bed; dark or raw appearance of the tongue; livid blotches over the body, particularly the præcordia; faintings or coma, and glazed eyes.—The blood at this period is black, thin, and dissolved,

its fibrin seems diminished, and it does not separate into crassamentum or serum; or if it does, the former consists of a thin dark jelly, with the black colouring matter precipitated towards the bottom of the vessel.

365. Such is the usual progress of severe inflammatory fever, as it fell under the author's observations, and as observed by the most eminent writers, under circumstances which seemed to preclude the influence of marsh exhalations. It has been a most prevalent and destructive disease in the West Indies and Mediterranean, during hot seasons, amongst sailors and soldiers unseasoned to these climates. It is not liable to recur; and, unlike the continued form of fever caused chiefly by malaria or marsh exhalations, it is neither preceded by, nor passes into, disease of a periodic type, nor is followed by enlargements of any of the abdominal viscera, unless the patient has been exposed to such exhalations during convalescence. A first attack prevents a second, if the individual continue in the climate which caused it; but if he return to a cold country, and reside there until the energy of his system is restored, he becomes liable, upon his return to the hot climate, to a second attack, although less so than before, and in a milder form: Numerous proofs of this position have come under my observation. The fever will not prevent those diseases which proceed from marsh exhalations; but, if the person who has been seasoned by it, be seized by fever from this cause, the periodic type will be assumed, and visceral disease will frequently supervene.

366. Of a number of persons whom I treated in this fever in 1817, and who soon afterwards were exposed to marsh exhalations in their concentrated form, not one escaped agues, remittents, or dysentery.—I do not believe that this—the climate or seasoning fever—will exempt from pestilential yellow fever, although it may lessen the susceptibility to it, when the individual has not immediately changed the climate.—Instances are numerous of seasoned persons—of those who have suffered this, the climate, or severe inflammatory fever—afterwards being seized with endemic or remittent fever, or with the pestilential disease.

367. *δ.* The complications of the grade of ardent fever are not so distinct as those presented by the milder form.—Some cases occur in which the cerebral symptoms are of greater intensity than usual, and closely resemble those of the most severe phrenitis. Such are most common in persons who have undergone much exertion whilst exposed to a very hot sun, shortly before the attack. But these symptoms, even when most violent, subside upon the superintention of exhaustion, and of the constant vomitings, ending that stage.—In almost all instances, the gastric affection is excessive, particularly at an advanced period; but this is so characteristic of the malady, that it can hardly be called a complication. Often, however, when the cerebral affection is very great, the gastric irritability is not remarkable; and when the latter is excessive, the former is but slight.—Biliary disorder is sometimes very prominent, especially during the period of excitement; but it seldom amounts to more than functional disturbance—than an evacuation of bile, often in great quantity, and of morbid quality. There is evidently excited vascular action in the liver, as well as in other

important viscera, but it is not actual inflammation—at least, suppuration is never observed in dissection of fatal cases. (For *Diagnosis*, see § 243—247.; and *YELLOW FEVER*.)

368. *Terminations and Prognosis.*—(a) Ardent or severe inflammatory fever, if not arrested by an early and energetic antiphlogistic treatment, rapidly terminates in exhaustion of vital power, with alteration of the blood, and organic change of the internal viscera, manifested especially in certain tissues.—1st. A resolution or subsidence of the excited action, without the supervention of the stage of collapse or exhaustion, seldom occurs, unless an appropriate treatment has been adopted. When the period of excitement is early and duly moderated, the severe symptoms of exhaustion either do

not appear, or are very slight, debility of short duration being only present; and the patient rapidly recovers without any visceral disease. The stage of exhaustion is great in proportion to the violence of excitement, and in it the more unfavourable terminations occur.—2d. Organic change of some important organ may supervene during excitement, but rarely to an extent sufficient to produce death: it consists chiefly of vascular injection; discolouration and softening of parts; effusion of serum, lymph, or blood; and takes place most frequently within the head, and in the digestive organs. Purulent matter is never formed in this period, nor subsequently.

369. (b) In the stage of collapse, several changes occur; but death is owing rather to their conjoint influence, than to either singly.—1st. Exhaustion of vital power is always present, but not to an extent sufficient of itself to arrest the organic functions.—2d. Deterioration or change of the blood obviously takes place, and is shown by the state of this fluid both during life and after death; but the nature of this change is not fully ascertained; whatever may be its nature, it is merely consequent upon the altered state of organic nervous influence.—3d. It is very probable that exhaustion of this influence, and the resulting changes in the blood, so affect the irritability and tonicity of fibrous and contractile structures as to impair these vital manifestations, and thereby to favour or even to induce the alterations observed towards a fatal close, particularly those affecting the capillary system and mucous tissues; for the vital tone of the extreme vessels and of the digestive mucous surface being thus impaired, and the blood being more fluid and dissolved, as well as otherwise altered, hæmorrhage readily occurs, with discolouration of the skin and of membranous parts; the blotches, &c. observed during the latter stages, proceeding from these pathological states. That the head should appear to suffer especially during the period of excitement, is a necessary consequence of the physical relations of this part, in connection with general vascular excitement; and that the stomach and digestive mucous surface should evince predominant disorder at an advanced stage, may be ascribed to the irruption of acrid or vitiated secretions, particularly the biliary, to the state of organic nervous power, and to the changes induced in the blood.

370. *ζ. The Prognosis* entirely depends upon the period at which the disease is subjected to appropriate treatment, and upon the violence of the seizure.—When the stage of excitement has but recently commenced, the treatment about to be

recommended will generally arrest the disease; but the nearer this stage approaches its acme, or that of exhaustion, the greater is the danger, as those changes in the organic nervous influence, in the blood, and in the vital tonicity of contractile parts, may be considered as having begun; and active depletions are then not so well endured, nor productive of the same effects, as at an earlier period. When symptoms of collapse appear, the danger is very great, and in proportion to the progress of this stage and the urgency of its characteristic phenomena, particularly discolouration of the skin, black vomit, and passive hæmorrhages, it becomes extreme; recovery seldom taking place when those symptoms are fully developed.—When the cerebral affection is very remarkable at an early stage, the danger is even then great, as the effects of the treatment imperatively required, conjointly with the exhaustion consequent upon excessive action, will induce a state, which, although much less dangerous than that which would indubitably follow unrestrained action, is still attended by much risk, and often requires the prudent exhibition of restoratives, &c.

371. *The Duration* of this fever varies from two to six or seven days. A fatal termination commonly takes place on the fourth or fifth day.

On examination, *post mortem*, more or less evidence of increased vascular action, often amounting to inflammation, or its consequences, is observed in the membranes of the brain, in the internal surface of the stomach and bowels, and more rarely in the pleura and serous membranes of the abdomen. The digestive mucous surface is studded with numerous dark or ecchymotic spots, from which a fluid black blood seen to ooze. The liver is frequently congested, sometimes larger and softer than natural, and of a dark colour, owing to the quantity of black blood in its vessels. The spleen is somewhat enlarged, soft, friable; and the omentum injected.—The well as the mucous surfaces, especially the peritoneal cavity, often present livid or dark patches. The blood is every where fluid, black, and dissolved. The internal surface of the heart and large vessels, both arteries and veins, was of a dark red or livid tint in a few cases which I examined; but this point requires further investigation, as my opportunities were not sufficient for the satisfactory examination of it in a number of the universality of its occurrence, and the exact changes on which this appearance depends.

72. *C. Nature of the Disease.*—Fever produced by paludal miasms, or by infectious emanations from living or dead animal matter, are universally preceded by well-marked symptoms, characteristic of the stages of *premonition* (§ 33.) and of *invasion* (§ 35.). But inflammatory fever, especially in its more severe form, is seldom preceded by more than chills, unless cold, or other causes which suddenly arrest the cutaneous excretions, have been concerned in producing it. In those fevers, a poisonous agent has infected the frame, and more or less depressed its vital energies, particularly as they are manifested in the organic nervous system; vascular reaction being consequent upon such depression, as shown above (§ 95, 96.). But in this fever, the injurious agent, or primary pathological change, is generated within the system from the action of new and unwonted in-

fluences, generally climatorial or atmospheric. That this agent is not of a depressing kind, as respects its primary operation, is manifest, from the general absence, at the commencement of the disease, of those phenomena which indicate this kind of action. That it is of an irritating or exciting kind, may be inferred, not merely from the character of the invading symptoms, but also from the changes primarily induced by the remote causes. — If we inquire into the nature of the changes, we shall find them — 1st, As respects the *mild inflammatory fevers* of cold or temperate climates, to consist — (a) of the organic and nervous excitement consequent upon the rapid and increased oxygenation of the blood during cold and dry states of the air, probably aided by the accumulations of the electro-motive agencies in the system which these states manifestly favour; — (b) of the super-abundance of irritating matters in the circulating fluids resulting from casual interruptions to one or more of the eliminating or depurating processes constantly going on in the animal economy; — (c) of the combination of these circumstances or primary pathological conditions. If we grant that the former of these obtains, it is very obvious that the occurrence of the latter will further excite and increase it; even a susceptibility to the former, as marked by high irritability of fibre, may be readily kindled into morbidly increased action, by causes of irritation which may have accumulated either within the vessels — in the blood itself; or external to them — in excreting organs and surfaces. These pathological states are the necessary results of concurrent causes, which primarily excite the sensible and susceptible parts of the system, and which retard or prevent the elimination of irritating materials from the vital current, and supply and sustain these parts; the accumulation of these materials either increasing the excitement, or giving rise to it. It must necessarily follow that the excitation thus induced will increase itself to a degree, and with a rapidity, commensurate with its intensity, and thereby induce the phenomena characterising the advanced periods of the disease, which are especially remarkable in the severe or climate fever of warm countries.

2d. As respects the *severe inflammatory fever*, the procession of phenomena must necessarily be different, as it generally arises from causes different, or even opposite, to those just indicated — from a very high temperature, often conjoined with rich, nutritious, and heating food, stimulating drinks, and suppressed perspiration. Either of these is alone sufficient to induce the disease; but, when they co-operate, the effect is more certain and severe. They all act in a similar manner; — they excite the organic nervous system inordinately; increase the actions of the liver, and irritate its vessels; alter the constitution of the blood, causing it to abound with stimulating and injurious materials; and render the secretions and excretions acid or morbidly exciting. Thus the most violent states of this fever often proceed directly from these causes, without any evidence of primary subaction or a cold stage, unless depressing agents, such as cold, human effluvia, or malaria, concur with them in producing disease; in which case the consequent fever will present features modified accordingly. If cold act upon persons who are under the influence of these ex-

citing causes, a slightly cold stage will often be directly induced thereby. If animal or vegetable miasms concur with them, the fever will present adynamic or malignant characters in proportion to the activity of either of these agents. But when the above direct causes of excitement act solely or principally, their influence upon the organic nervous system is very energetically expressed, and manifested throughout the vascular system, especially that of the brain, liver, and digestive mucous surface. Thus, inflammatory fever differs from the other varieties of idiopathic fever — 1st, in its proceeding from causes, the primary action of which is exciting or irritating; 2d, in excitement or irritation being more or less evinced by it from the commencement.

374. Of the changes that take place in the advanced period of the disease, the most remarkable are those affecting the blood, and the digestive organs. As the stage of excitement merges into that of exhaustion, the blood changes from a florid to a dark colour; loses its property of separating into crassamentum and serum, and of firmly coagulating; becomes more fluid; and seems deprived of much of its fibrinous and albuminous constituents. (See art. BLOOD, § 128.) According to Dr. STEVENS, its saline ingredients are also greatly diminished. The chief cause of these alterations is evidently exhausted organic, nervous, or vital power; and this is further evinced by a loss of the tone of the extreme vessels, and of the irritability of the moving fibre, always co-ordinately observed in cases presenting this change in the blood. Among the most striking consequences of exhaustion of vital power, as thus manifested in the extreme vessels and blood, are, discolouration of the skin, and passive hæmorrhages from mucous surfaces — phenomena characterising the last stage of the most unfavourable cases of the intense disease. The gastric disturbance in the early stages generally proceeds from excited vascular action, and from the passage of irritating secretions into the stomach, in connection with an increased susceptibility and irritability of the organ. In the latter stages, it more especially results from the morbid secretions poured into the stomach, and the irritated or inflamed state of its villous surface.

375. The source of the black matter passed from the stomach and bowels in the last stage of this and of other severe fevers of warm countries, has been variously stated. Some consider the black colour to proceed from the exudation of dark blood, which, in mixing with the secretions of the stomach, liver, and bowels, imparts to them a still darker tint. Some ascribe it chiefly to the bile, and secretions from the digestive mucous follicles, which are often both very dark and thick, in the last stage of the more malignant kinds of intertropical fevers; and others believe it to arise both ways. There is no doubt that all the secretions poured into the digestive canal are more or less diseased, particularly in the latter stages: but it is as clear, that the black colour mainly depends upon the state of the blood; and that all the matter ejected upwards and downwards, presenting this appearance, does not consist of altered secretions merely, — a great part of it probably being an exudation of blood from the mucous surface. I believe, also, that these matters vary very remarkably in the ardent climate fever, in the more malignant forms

of marsh or endemic fevers, and in the pestilential yellow fever — the diseases thus characterised. Dr. JACKSON remarks that the secretions from the digestive mucous surface are ropy and clear during the early periods, and are brown or black in the latter — sometimes black as soot; and that the sooty or ink-like colour is chiefly observed where the head and stomach are simultaneously attacked. When we consider that the blood becomes darker than natural, as well as otherwise changed, early in the period of exhaustion, and that the liver and mucous follicles of the digestive canal, with the kidneys, are the principal organs of depuration, or channels by which the elements producing these changes are eliminated from the circulation, we need not be surprised at the secretions, which these elements go to form, and which these organs excrete, presenting somewhat similar characters. It must however be admitted, that the share which the secretions perform in producing this phenomenon, or that which the exudation of blood has in giving rise to it, will vary much in different varieties or cases of intertropical fevers. — The ... with which a dissolution of the tissues takes place after death, in the severe forms of climate fever, deserves notice, as marking the rapidity of vital exhaustion, and as resulting from the changes of the blood; these changes commencing with the stage of exhaustion, and advancing until this fluid is no longer capable of influencing the nervous system, and of preserving the irritability of contractile parts — or until it poisons, instead of exciting, the sensitive and moving tissues.

376. iii. **TREATMENT.** — The means that should be employed in the *mild* and *severe* forms of inflammatory fever are the same — the only difference being in the promptitude and energy with which they ought to be administered. In the mild diseases, particularly in cold or temperate climates, the febrile excitement is much more prolonged than in the severe, which rapidly exhausts itself by its violence. The necessity, therefore, of restraining it at its commencement is great in proportion to its activity. In the milder forms, vascular excitement may continue several days, and depletions may be practised with advantage as long as this state persists; but, in the severe, the period in which they can be employed with benefit passes away sometimes in a few hours; and continues seldom beyond the third, and rarely beyond the fourth day. As in the state of excitement, so in that of exhaustion, the treatment is the same in all the varieties of this fever — the only difference being in the choice of means, in the activity with which they should be employed, and in the appropriation of them to the varying circumstances of the case.

377. *A. — a. During excitement*, and especially at its commencement, vascular depletions should be practised, and carried as far as the state of the pulse and other circumstances will permit; and in the manner described in the article **BLOOD** (§ 64.). The observations already made on this subject (§ 128—138.) will guide the inexperienced practitioner; but it should not be overlooked, that, in the intense climate fever, vascular depletion should be prompt, from a large orifice, large, and repeated, to be successful; and that the quantity of blood abstracted should depend chiefly upon the effect produced. Dr. JACKSON justly remarks that it should be taken in quantity

sufficient — whatever may be the amount — to relax the surface, and set free the secretions. Less than three pounds is rarely sufficient to produce this effect; and six have not been more than sufficient on some occasions: but whatever the amount may be, it will do comparatively little good if we stop short of the quantity which is requisite to effect a decided change. If delayed until the excitement is about to terminate in exhaustion, no benefit — or even mischief — may result from it; for the tonicity of the vascular system will have then become too far weakened to admit of the vessels accommodating themselves to a considerable loss of blood. When, therefore, the symptoms indicating the passage of excitement into collapse, or the deceptive abatement of the febrile action indicating this state, is observed — and particularly if yellowish blotches appear about the mouth, face, or breast — the time for bleeding with advantage has passed. If, however, headach is still urgent, the pulse still strong, and the features have not collapsed, blood may yet be abstracted cautiously and in moderation. When the cerebral affection is considerable or persistent, and is unattended by marked symptoms of exhaustion, depletion, general or local, may be repeated. Where the headach is particularly intense — rendering, throbbing, &c. — with hot inflamed eyes, one bloodletting, however large or early, will seldom be sufficient. In such cases, the body should be immersed in a tepid, or slightly warm, bath, and well scrubbed with brushes, &c., until the cutaneous circulation is rendered free. Cold should also be applied to the head, both during the bath and subsequently, the hair having been cut off. After the patient is removed to bed, the vascular action and headach will often become again excessive; and, although a very few hours only may have elapsed, will require the repetition of very large depletions. Spontaneous hæmorrhage during excitement should not be arrested. In the most severe cases, especially when determination to the brain is great, epistaxis often occurs, but is generally slight, or almost instantly disappears. In these, vascular depletions, aided by the other means appropriate to this state, ought to be most energetically practised; for nothing else will save from fatal changes taking place within the brain, or from as fatal exhaustion, and its effects.

378. *Purgatives*, in one form or other, are a material part of the subsequent means. *Calomel* with *jalap* and *James's powder* may be given, in the form of pill, from time to time; and, after a few doses have been taken, a cathartic enema should be administered, and repeated. As to the choice of the enema, the practitioner should be guided by the progress the disease has made. At an early period, *sea water*, with or without the addition of castor oil, or of extract of colocynth, is appropriate; subsequently, olive oil and oil of turpentine may be substituted for the latter. — *Emetics* are not suited to any state of this fever; although they are often serviceable in fevers which have been confounded with it, more especially at the commencement of the various forms of marsh fever.

379. *b. Refrigerants*, when judiciously exhibited, are valuable adjuncts in the period of excitement. Those already enumerated, both *internal* and *external* (§ 139—141.), should be perseveringly em-

ployed. Of these, the *nitrate of potash*, the *nitrate of soda*, and *muriate of ammonia*, and injections of *cold sea water*, as recommended by Mr. DICKENSON, are most deserving of notice. HILLARY prescribed a scruple of nitre and twelve grains of muriate of ammonia three or four times a day, in water; and Dr. CONWELL has recently shown the propriety of the practice in his instructive work, and its applicability to other states of febrile action. In the more ardent climate fever, this medicine should be very frequently exhibited during excitement; cold applications to the head, and the cold affusion, being also assiduously employed. The refrigerants just mentioned may likewise be taken frequently in conjunction with the *liquor ammonia acetatis* and *spiritus aetheris nitrici*. After depletions, they will often prevent the distressing irritability of the stomach, which increases with the unfavourable progress of the disease, and allay it when present. Although this is the most violent form of fever which comes before the physician, yet it may be arrested at an early period with greater certainty than any other, by the decided employment of the foregoing measures.

380. *c. External derivatives*, and more particularly *blisters*, have been very much employed against the inflammatory forms of fever, with the view of allaying the irritability of the stomach, and protecting it and other viscera from impending injury. But I believe that they have been as often injurious as beneficial; and that, owing to a too early use of them, they have increased the general excitement, and not derived from internal parts. It is only after vascular action is subdued as low as may safely be attempted, by the foregoing treatment, that *blisters** should be

* The following case will show the progress of the disease, as well as its cerebral complication, in its most severe form; and the little effect which a depletory practice short of what it requires produces upon it.

A soldier of a full and gross habit of body, aged 28, just arrived in the West Indies, during the hot and dry season, was attacked, at six o'clock in the morning, with giddiness, severe headache, and pain in the back and limbs. He came under treatment at six in the evening (twelve hours after the attack), and then these symptoms were violent; the face was flushed, the eyes heavy and injected; the breathing was laboured; the pulse frequent, sharp, and contracted; the heat great, and skin dry; thirst vehement; tongue white and foul. He was anxious, restless, and complained of oppression at the præcordia. He was bled to thirty two ounces; a purging bolus was given immediately, repeated in four hours, and accelerated by an enema. He seemed a little faint from the bleeding, and expressed case, but no decided relief. He passed the following night in much distress.

Second day of disease, in the morning, he complained of anxiety and uneasiness at the præcordia; sighed frequently, and breathed with catching and difficulty at times. Pulse quick, hard, and strong; the skin very hot and dry; intense pain in the head and loins. Bowels not freely opened by the purgatives. Was bled to fourteen ounces: the skin became moist; the pains remitted, but did not cease. Blisters to the head and epigastrium; calomel and James's powder, every third hour; inunction with mercurial ointment; saline diaphoretics. He sweated copiously in the afternoon, had some evacuations by stool, and seemed relieved.

Third day. — Anxiety and sense of burning at the præcordia; nausea and vomiting; ineffective motions downwards; skin dry; pulse strong, not frequent; thirst urgent; eye and countenance lurid; temper irritable and impatient; alarmed at his situation; complains of the blisters on his head, which give sensations of burning. The skin is dry, and the heat rather above natural. The tongue is somewhat rough and foul.

Fourth day. — Symptoms more unfavourable. He vomits occasionally, and his nose bled in the act of vomiting; anxious, restless, and very uneasy. Pulse regular, full, and strong; ideas confused; countenance irregularly tinged yellow.

employed in this disease; but they ought never to be applied on the head, unless in the stage of exhaustion, when coma or lethargy is present, and the pulse becomes weak and intermittent. The exhibition of *mercurials* with the view of inducing salivation should not be attempted in this fever; for this effect has never been produced unless in the milder cases, which would have recovered nevertheless.

381. *B. The period of exhaustion* presents comparatively few chances of recovery, especially when far advanced, and in severe cases; but these few should not be thrown away, either by a temporising or a trifling practice; or by the use of means already known to be unavailing. There can be no doubt, that the change commencing in the blood with the accession of this stage is one of the chief pathological states which should attract the attention of the practitioner; but the exact nature of that change has not been satisfactorily demonstrated. That it partly consists of diminished crasis, or a weakened vital attrac-

Fifth day. — Somewhat delirious; extremely restless and anxious; eyes red and muddy; gums red and hot; no salivation; pulse regular, full, but not weak; skin dry and of a deep yellowish shade; the bilatered surfaces dry and of a dark red approaching to a livid hue. He was washed with salt and water. Frequent small dark viscous evacuations.

Sixth day. — Delirious, with extreme restlessness; pulse soft, full, and slow; skin damp and clammy; heat moderate; vomits glutinous matter of a black colour; dark blotches in the skin; and a black sanies exudes from the nose and mouth. — He died in the afternoon, five days and twelve hours from the attack.

Dissection. — The vessels on the surface of the brain were remarkably turgid, giving a livid appearance to several places. Considerable effusion of lymph, and adhesions between the membranes had taken place, particularly near the falx. The stomach and intestines contained a large quantity of black matter. In the latter, it was thick as tar, and viscous as birdlime. The gall-bladder was half full of black bile.

Remarks. — The above case was not treated by the author. Twelve hours were lost before the patient received assistance. On the second day the bleeding was insufficient, and should have been carried further and repeated. The pulse evinced the necessity of it. In this disease, as in many others, the pulse may be safely followed. If the pulse become an unsafe guide, the fault is most generally that of the observer, who cannot interpret it aright. The application of two blisters at this time, before vascular action was sufficiently reduced, and more especially the application of one of them to the head, during predominant action in this quarter, was sealing the fate of the patient, — the bleeding in the first instance being just sufficient to give freedom to the circulation, but not adequate to reduce it; the blister adding fuel to the fire when it was about reaching its height. The inunction of mercurial ointment with the view of affecting the system was as fruitless, and just as rational, as respects this fever, as to attempt to extinguish a conflagration by a surgeon's syringe. On the *third day*, the great strength of pulse, and burning sensations in the head and præcordia, clearly indicated that large bloodlettings could alone have saved the patient, although late in the disease. The local complication, having prevented the sudden accession of this stage, and prolonged vascular excitement, admitted of a later recourse to depletions than in other circumstances. Even on the *fourth day*, owing to the cerebral complication, the pulse retained its strength, and, with all the other symptoms, evinced that bleeding should even then have been practised. After the first day, nothing appropriate was done; but much to aggravate the disease. As to the *dissection*, the usual routine only was gone through, and which, if pursued in a million of cases, would not advance our knowledge of the disease one step. The symptoms on the second and third days ought to have suggested a minute examination of the vascular system and blood; but these, as well as the digestive mucous surface, were unexplored. In this case, as in many others, the name of the disease, contradictory opinions as to its nature and origin, and empirical reports of successful methods of cure, misled the practitioner, and paralysed the treatment, when he ought to have been guided by a knowledge of morbid actions, and of rational means of removing them.

tion between the globules of the blood, and consequently of a defective power of coagulating, and of altered colour, has been shown by TOWNSE, and by every writer since his time, and is generally admitted: but the observations of Dr. STEVENS, as to the progressive loss of saline ingredients, which the blood undergoes with the progress of exhaustion, although now published several years, have not received that confirmation, for which there have been sufficient time and opportunity. They are not, however, therefore, altogether to be thrown aside, more especially as my experience has furnished me with facts calculated to support them in some measure. The exhaustion in this disease arises,—1st, from the previous excitement; and, 2dly, from the changes induced in the blood in the course of this stage, especially at its acme, manifestly depressing the organic nervous influence, the tonicity of the vascular system, and the action of the heart itself, to an extent often incompatible with the continuance of life. It is in this manner that death generally takes place in the intense climate fever; for, however considerable the lesion which the early excitement may have occasioned in the brain, or digestive organs, death is seldom the result of it in either of those parts. It should, moreover, be recollected that the disease cannot be cured by bloodletting alone, however necessary it may be to the subduing of excitement in the early stage; for although this state may be lowered by it, still dangerous exhaustion may nevertheless supervene with the characteristic changes of the blood, and all the consequent phenomena described by the earlier writers on this fever, particularly by TOWNSE, WARREN, HUMF. LING, HILLARY, &c.

382. *a.* From these considerations it is manifest that the *intentions of cure*, in this stage of the disease, should be—1st, to support or rally the manifestations of life in the different organs—to oppose the progressive vital exhaustion; 2dly, to counteract those changes which take place in the blood and vascular system. These indications should be simultaneously carried into effect; for the alterations in the state of vascular action and tone, as well as in the constitution of the blood, are more or less dependent upon the change in the organic nervous influence.—At the commencement of this period, and when vascular action still continues high in the encephalon or digestive mucous surface, a moderate local depletion may precede measures calculated to fulfil these intentions: but even this form of depletion can seldom be carried far; for the tonicity of the vascular system generally, and especially of the capillaries supplying the mucous surfaces, is too far exhausted to admit of that accommodation of the vessels to a considerable diminution of their contents which is so requisite to the restoration of a healthy state of circulation. The characteristic phenomena of the last stage—the hæmorrhages and discoloured blotches—are manifestly owing as much to the exhaustion of organic nervous influence and of irritability, as to the attendant changes in the blood. It is to these latter changes almost solely that Dr. STEVENS directs his means of cure in this stage; but it is evident that the vital conditions on which they depend should receive equal attention. He states that the quantity of the muriate of soda is greatly diminished in the

last stage of this and other malignant diseases; and that, in order to supply the deficiency, he at first gave a strong solution of this salt with nitrate of potash. He subsequently found that the chlorate of potash and other active saline agents answer the purpose equally well, especially those which do not irritate the stomach; and he now seems to prefer a combination of the muriate and carbonate of soda and chlorate of potash. The basis of this pathology and treatment is the relation subsisting between the colour of the blood and the saline matters contained in it. The power of certain salts, particularly the muriate of soda, the nitrate of potash, the tartrate of potash, &c., as well as of the alkaline carbonates, to render the venous blood florid, and to affect its fluidity and coagulating powers, was long since fully demonstrated by VERHEUSEN (vol. ii. p. 29.), SCHWENKE (*Hamatologia*, p. 190. *et passim*), HALEN (*Hamastat.* p. 154.), ELLER (*Mém. de l'Acad. des Sc. de Berlin*, t. vii. p. 13.), BOERHAAVE (*Elementa Chymie*, t. ii. p. 378.), PRITZ (*Lettre Seconde*, p. 34.), HALLER (*Elementa Physiol.* t. ii. p. 74.), SAUVAGES (*Sur l'Effet des Médicaments*, p. 37.), and others. A combination of the *nitrate of potash* and of the *muriate of ammonia* was always employed by HILLARY in this disease, and is applicable to every period of it. *Sea water* has long been a popular remedy for it and other West Indian fevers, and is very strongly recommended by ARZUJA and Mr. N. DICKINSON as an enema. Dr. CRUSIUM employed, in 1798, the *chlorate of potash*, and remarked its effects upon the blood; but, as Dr. STEVENS justly states, he exhibited other substances calculated to counteract its influence on the disease. But granting that the colour of the blood is changed to its healthy state by these salts, it does not follow either that they shall be absorbed into the circulation during the advanced stage of this fever, or that they shall have the effect of rallying the exhausted powers of life. As to both these circumstances, the sanguine expectations of Dr. STEVENS require confirmation. There can be no doubt that, to be serviceable, these medicines should be given sufficiently early in the exhaustion to allow time for their absorption; and that substances which irritate the digestive mucous surface, and prevent or delay absorption, should not also be exhibited. In the present state of our knowledge, and judging from some experience of the effects of these salts in the advanced stages of other severe fevers, I infer, that they ought not to be confided in alone, but should be conjoined with such other means as are calculated to rally or support the vital manifestations, and promote the excreting functions—always recollecting that, in order to preserve the blood in a state suitable to the continuance of life, the depurative actions of the various emunctories require to be promoted.

383. *b.* In the early stage of exhaustion, HILLARY'S saline mixture may be prescribed; or the same salts—the *nitrate of potash* and *muriate of ammonia*—may be given in camphor julap; the quantity of camphor being regulated according to the grade of depression. The *chlorate of potash* may likewise be given in the same vehicle; or the *citrate* or *tartrate of potash* or *soda*, with an excess of the alkali. It is very important, to avoid such means as will increase the irritability of stomach characterising this stage of the disease;

and I believe that these medicines are much less likely to have this effect than almost any other. A full dose of *calomel* will often have the effect of allaying for a while the irritable state of this viscus; but, when exhaustion is very considerable, its sedative influence on the organic nervous energy will be injurious, if it be not combined with camphor or ammonia. During the course of this stage, little benefit will accrue from such purgatives as irritate the stomach. An occasional Seidlitz powder, or the saline medicines just mentioned, assisted by frequent injections of sea or salt water, with the addition of an ounce or two of sweet oil, will prove much more serviceable than more active means, which will only increase the inflammatory irritation of the digestive mucous surface, and exhaust its vitality. Dr. JACKSON most frequently prescribed a combination of calomel, James's powder, nitre, sulphur, and soda, in the form of bolus, which was given every fourth hour; and afterwards the infusion of senna, with liquor ammoniac acetatis, so as sufficiently to promote the action of the bowels.

384. c. In a further advanced state, and more especially if the pulse become irregular or intermittent, the more energetic restorative and nerve medicines should be prescribed, variously combined with one another, or with the saline substances just mentioned. Warm or rubefacient epithems, or sinapisms, should be also applied over the epigastrium, or to the lower extremities; and hot wine with spices; or champagne; or large doses of camphor with nitrate or chlorate of potash; or brandy and water, as the vehicle of effervescent salts; or half-drachm doses of turpentine, every two hours, in milk, or in spruce or ginger beer, may be resorted to, according to circumstances. But, before the exhaustion has proceeded thus far, these remedies, in more moderate doses; the preparations of ammonia, combined with saline or other medicines, the warm bath, &c.; may be employed, with a cautious observation of their effects.—Upon the whole, the principles developed above, in respect of the treatment of exhaustion of vital power in fever (§ 143—148.) should be adhered to.

385. d. During the progress of the stage of exhaustion, much attention ought to be directed to the beverage of the patient. Spruce beer, soda water, Seltzer water, bottled porter, bottled small beer, may be allowed, but only in small quantity at a time, as a considerable draught is generally followed by vomiting. These beverages may, moreover, be made the vehicle for the exhibition of refrigerant, antacid, or saline medicines, as the nitrate of potash, the alkaline subcarbonates, &c. During convalescence, the diet should be carefully regulated, and confined at first to farinaceous articles, in moderate quantity.

386. C. The modified form of *inflammatory continued fever*, arising from the concurrence of terrestrial exhalations, with climatorial influence, must be treated, in the periods of excitement and of exhaustion, conformably with the views explained above. This form of fever, after the inflammatory excitement is subdued by copious depletions, sometimes assumes a remittent character. In this case, the exhibition of bark or the sulphate of quinine during the remissions will be necessary. Whatever complication, also, which may either characterise this fever from its com-

mencement, or appear in its course, must be treated by depletions, local especially, and derivatives, according to the principles already advocated. — (See BILIO-GASTRIC FEVER.)

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XVIII. BILIO-GASTRIC FEVER. — SYN. *Fébris Biliosa*, Hippocrates, Stahl, Selle, Finke, Tissot, and Stoll; *Synochus Biliosa*, Galen; *Febris Gastrica*, Baillou, Lentin; *F. Gastro-Hepatica*, Hildenbrand; *Febris Cholericæ*, Auct. var.; *Fièvre Meningo-gastrique*, Pinel; *Gastrische Fieber*, Richter; *Gastric Fever*, *Gastro-bilious Fever*, *Bilious Fever*, *Bilious Continued Fever*, *Endemic Fever*, *Gastric Inflammatory or Bilio-Inflammatory Fever*.

387. DEFIN. — Vascular reaction following chills or rigors and other symptoms of premonition and invasion, with predominant affection of the biliary functions, and of the digestive mucous surface, frequently with yellowness of the skin, in the severer cases.

388. This fever is either sporadic, endemic, or epidemic. — It is endemic in warm countries and marshy situations among Europeans, particularly those who have not been long resident in these parts; and in marshy localities in the summer and autumn, in temperate climates. — It is epidemic in some seasons, particularly in autumn when the summer has been hot, after a wet spring, or after great falls of rain, or after inundations, and when great numbers of predisposed persons, especially from high latitudes, visit such localities. In these circumstances and persons, it proves the

seasoning fever. It is observed chiefly in adults of the bilious or bilio-sanguine temperaments, and in persons addicted to spirituous liquors. It is a very prevalent fever in the countries bordering on the Mediterranean, in the East Indies, and in America, and consequently in fleets and armies in these parts.

389. *Gastro-bilious* [fever is caused chiefly by exhalations from the soil, or from vegetable and animal matter undergoing decomposition, in connection with atmospheric heat; by exposure to the sun; by the night airs or dews, and the influence of cold following such exposures or excessive exertion or high ranges of temperature; by intemperance and errors of diet or of regimen; by excesses in vinous or spirituous liquors; by great exertions following inactivity; by over-eating, or by a sudden transition from a very poor to a very full or rich diet, as in the case of soldiers and recruits; by anger and other mental emotions; and by the causes already enumerated (§ 330, b.)—It most frequently, however, arises from the concurrence of two or more of these causes. The influence of infection in producing it has been doubted; but the experience of Drs. DENMARK and BOYD, in ships and hospitals in the Mediterranean, has demonstrated its occasional origin in the cause—or at least the power infection evinces in producing a severe modification of it.

390. i. *DESCRIPTION*.—This fever, in robust and plethoric persons, approaches severe inflammatory fever on the one hand, and the more inflammatory forms of remittent on the other: or it presents a predominance of the characters of either, according to the intensity of the causes and the peculiar circumstances of the affected. The chief difference between inflammatory fever and it, depends upon the causes whence they respectively proceed; the former arising principally from atmospheric vicissitudes and climatorial influence, in connection with suppressed perspiration; the latter chiefly from marsh and vegeto-animal miasms (see *Diagnosis*). Its similarity to, and connection with, remittents, are referable to the origin of both in the same causes; the only differences between them resulting from the intensity and concurrence of the causes, and from individual predisposition—being differences chiefly of grade and of type, as shown by Dr. BOYD, and confirmed by my own observation. That it should therefore be confounded with these fevers, cannot be a matter of surprise, and is of little importance as respects the treatment. But when it is mistaken for the synchoid and adynamic species with predominant affection of the digestive mucous surface, then the results may be serious.

391. *Gastro-bilious* fever is generally preceded by lassitude, nausea or want of appetite; by dull pains in the back and limbs; and by flatulence and indigestion. The breath is fetid; the tongue is covered by a yellowish mucous coating; the mouth is clammy, and the taste perverted; the bowels are costive, or relaxed, or irregular; and the countenance is pale or somewhat sunk. This state—the *premonitory stage*—may continue several days, the patient not being confined to bed; but generally in the morning he is seized with chills or rigors, preceded by a sensation of cold creeping along the spine. To these soon succeed severe frontal headache, vertigo, nausea, vomiting, burning heat of skin, restlessness, watchful-

ness, slight anxiety at the præcordia, pain and oppression in the epigastrium, and in one or both hypochondria, with more or less soreness, fulness, and tenderness. The eyes are moist and injected, the conjunctiva often yellowish; the face is flushed; the breathing oppressed and accelerated; the pulse full, large, quick, and strong, rarely hard; the tongue is clammy, moist, furred, and yellowish, with a bitter taste in the mouth; the thirst is urgent, the breath fetid; the bowels are obstinately costive, or loose; the stools bilious, and the urine scanty and dark. When the stomach and bowels are inordinately affected, cerebral congestion very frequently supervenes at a later period. As the disease advances, the pulse feels less full, and is weaker than in health. The thirst and anxiety are increased; and the upper parts of the body are sometimes covered by a profuse sweat, whilst the skin still continues hot.

392. If the attack be very severe, or neglected at the commencement of reaction, the pain of the head is aggravated; and a disinclination to answer questions, stupor, and insensibility appear about the second or third day. The eyes are turgid or inflamed; a bilious yellow tinge spreads from the face downwards over the body; the tongue is covered by a thick yellow crust, is red at its sides, and dry and brown in the centre; the strength is diminished; nausea with bilious vomiting is often distressing; the pulse becomes weaker and quicker; and the patient has an insatiable thirst, and desire of cold acidulated fluids. The urine is very high coloured, voided often, and produces scalding in passing it. The bowels are either costive or loose.

393. If the disease has not been mitigated, a slight remission occurs on the third, fourth, or fifth day, generally in the morning; the face and chest being covered by perspiration, and the temperature of the surface reduced. But the symptoms are exasperated towards evening; the tongue becoming drier and darker; the epigastrium and hypochondria more painful, tender, and often also tumid and tense; the pulse more rapid, constricted, or weak. The anxiety at the præcordia is now changed into severe pain, aggravated on pressure, with oppression and frequent sighing; the countenance is sunk; there is vomiting of putrid or offensive bile; the stools are liquid, greenish brown, fetid, slimy, and occasionally bloody or dysenteric; the skin is often deeply jaundiced, and emits a putrid bilious odour. The patient is now collected, but various adynamic and malignant symptoms appear from the fifth to the seventh or eighth day. These are—tremors of the extremities, and of the tongue when held out; startings of the tendons; pain about the pæves, with inability to pass the urine; vomiting of a dark, glairy matter; difficulty of swallowing; sometimes swelling and suppuration of the parotid glands; tympanitic distension of the abdomen; inexpressive, glassy eyes, dilated pupils; clammy sweats, difficult and anxious breathing, and black tongue. To these succeed delirium, coma, intermitting pulse, cold extremities, and death, sometimes with convulsions. Petchiæ, blotches, and passive discharges of blood from the nostrils, gums, fauces, &c., are but rarely observed.

394. *Modifications*.—All the above symptoms are not present in the same case, nor always run the same course. In the young, strong, plethoric,

and unseasoned, in the sanguine and intemperate, and in very hot and dry seasons, this disease approaches very closely to severe inflammatory fever (§ 359.) with predominant affection of the stomach and membranes of the brain, or of the digestive mucous surface generally. But in weak or elderly persons, and in colder climates and seasons, it is more mild, and approaches, or even runs into, some one of the varieties of remittent. Indeed, it may assume either *inflammatory* or *adynamic* characters, or present complications similar to those observed in that fever, from which it differs merely in type. When animal miasms and infection are associated with the other causes, as in crowded transports, ships of war, prisons, camps, &c., in warm climates, or in hot seasons, more or less adynamia or depression of vital power, with contamination of the circulating fluids; is evinced early in the disease—*malignant* and nervous symptoms predominating towards the close. In such cases, the premonitory and invading stages are very manifest: reaction is often low or imperfect, as in the more adynamic states of remittent, or rather in the malignant form of fever about to be noticed; and the type is perfectly continued. But when it arises chiefly from terrestrial exhalations, the circulating and secreted fluids are less vitiated, and it presents more of the remitting character. When these causes are very intense, and the predisposition great, the disease often assumes a very *concentrated* and *acute* form, runs its course rapidly, and often passes into the remitting type, or induces visceral disease. These violent states of bilio-gastric fever have been often met by Mr. BOYLE and myself in Africa, and by Dr. J. JOHNSON, ANNESLEY, and others in the East Indies. This fever thus may resemble, according to the nature of the causes—predisposing and exciting,—of the seasons, of the locality and climate, and of the epidemic constitution, either inflammatory, or remittent fever, or even malignant fever—may possess more or less of a gastric character in one case, of a bilious state in another, of an inflammatory condition in a third, of cerebral affection in a fourth, of an adynamic or malignant form in a fifth, or a predominance of any two or more of them. These modifications give rise to the appellations, gastric, bilious, yellow, gastro-bilious, gastro-inflammatory, bilious inflammatory, bilious continued, gastro-meningitic, &c., applied to it by modern writers, and cause it frequently to be confounded with the severe inflammatory fever on the one hand, and with pestilential yellow fever on the other.

395. ii. *Duration and Terminations.*—These depend upon various circumstances—chiefly upon the exciting causes and circumstances proper to the patient.—*a.* When judiciously treated at an early stage, a favourable change generally appears from the third to the seventh day, or even earlier.—*b.* But when the disease has been neglected, or aggravated by improper means, death may take place from the fifth to the eighth day, preceded by the unfavourable signs just enumerated (§ 393.). In these, the brain or its membranes, or the digestive mucous surface, or all of them, have suffered very considerably, and are more or less changed.—*c.* In some cases, and when it is occasioned by the concurrence of marsh exhalations with the other

causes enumerated above, more particularly in hot climates, or in temperate countries during warm summers and autumns, the inflammatory action extends to the mucous surface of the small intestines and large bowels, the disease terminating either in enteritis or acute dysentery. As in the remittent type, so in this, the state of the secretions, particularly the biliary, and the nature of the ingesta, concur with the exciting causes in developing these complications (§ 237.). *d.* The fever may also pass into *inflammation* or abscess of the liver. This is a frequent complication and termination of the bilio-gastric fever of the East Indies, and of some other intertropical countries. When abscess forms in the liver in these cases, dysenteric symptoms are often superadded.—*e.* When the disease has not been entirely arrested, but only mitigated by treatment, or when it has been mild at the commencement, and caused chiefly by terrestrial exhalations, the patient continuing subjected to their influence, it may pass into a *remittent*, or even an *intermittent* type. In such cases, enlargements of the spleen, of the liver, of the pancreas, and even of the mesenteric glands, may ultimately supervene.—*f.* *Relapses* are more frequent in this than in almost any other fever, and are caused chiefly by a too early recourse to a full or stimulating diet, by irregularities in food or drink, by incautious exposure to the night air or to cold, by vicissitudes of temperature or of season, and by terrestrial or vegetable animal miasms.—The *leçons* observed in *fatal* cases are altogether similar to those found in the more inflammatory and severe forms of remittent.

396. iii. *Diagnosis.*—*Bilio-gastric* fever nearly resembles—1st. *Inflammatory fever*, in its milder states;—2d. *Remittent fever*, in its severe forms; and, 3d. *Epidemic or pestilential yellow fever*.—*a.* From the *first*, it is distinguished by premonitory symptoms of considerable severity and continuance; by the marked chills and rigors characterising its invasion; by the early occurrence of nausea and bilious vomiting; by the less continued and violent state of vascular reaction; by the copious and early bilious evacuations and the bilious suffusion of the skin; and by the usually longer duration of the disease. In severe climate or inflammatory fever, on the other hand, the invasion is sudden, and vascular action more or less excited from the commencement—premonitory symptoms being hardly observed. Subsequently the blood undergoes a much more remarkable change than in gastric fever—the yellow and livid blotches appearing in the last stage, being very different from the bilious suffusion of this disease; and the hæmorrhage from the mucous surface, the black vomit, and dissolution of the fluids, &c., so frequent in the former, being neither so common nor so great in the latter. The pain in, and determination to, the head, is more severe in the first stage of inflammatory fever, and the disorder of the stomach much less than in gastro-bilious fever; but the affection of the stomach becomes more violent and unremitting at an advanced stage of the former, than of the latter.

397. *b.* *Gastro-bilious fever* is distinguished from *remittent fever* chiefly by its continued or imperfectly remitting course. In other re-

spects there is little difference between it and the severer forms (§ 230, 232.) of that disease, excepting that its severity is often greater, and its duration shorter. Indeed, this is but a variety of marsh fever, owing its continued and otherwise modified characters to high temperature and other concurrent circumstances.

398. As this fever varies from the ardent seasoning, to the distinctly remittent type, with the intensity and concurrence of the causes producing it; and as it may occur contemporaneously with the pure climatic fever, and with the more inflammatory forms of remittent fever, as frequently observed in the West Indies and Mediterranean during the hot months, particularly among soldiers and sailors; so it is often difficult to distinguish between them. The chief circumstances, however, which will fix the attention of the practitioner, are—the manner of invasion; the distinctness, obscurity, or absence of remissions; the degree of excitement characterising the early period, especially as expressed upon the vascular system; the kind of excitement, particularly in respect of sthenic or asthenic action; and the state of the circulating fluid, and of the secretions and excre-

399. *c.* From *epidemic or pestilential yellow fever*, this disease is distinguished—by passing into the periodic type in many instances, and by frequently leaving visceral disease behind it; by its attacking the same individual oftener than once, if he have intermediately undergone a change of locality or climate; by the more inflammatory or sthenic character of the period of excitement, and the much less remarkable change in the blood and soft solids from the commencement; by the headach being confined chiefly to the temples; by the yellowness appearing early, and first in the eyes, and being of bilious origin; by much less irritability of the stomach in the advanced stages; and by its longer duration—generally from five to fourteen days. In pestilential yellow fever, the yellowness of the skin is not frequent, and is of a pale lemon colour; the face has a putrid, bloated, or livid hue; its duration is from one to five days; it never passes into the periodic type, nor leaves visceral disease behind it; fatal cases always being attended by the black vomit at their close. Moreover, remittent, inflammatory, and bilious fevers are never infectious, unless under peculiarly favourable circumstances, when the latter may assume this character; but epidemic yellow fever is remarkably infectious; and, whilst these are generally benefited by vascular depletions during the period of excitement, the epidemic malady requires a different method of cure.

400. *iv.* The *Prognosis* depends upon the intensity and concurrence of the exciting causes; upon the severity of the attack; upon the treatment adopted at the commencement; upon the state of vascular reaction; and upon the complications that may arise.—It may be favourable, if

the attack be mild or simple, the skin moist, the vomiting moderate, and the matters ejected consist chiefly of mucus or ingesta; if the tongue become moist, the bowels loose, and the stools bilious; if the nervous and vital powers be not much reduced; and if the yellow suffusion be slight or slow in its progress.—*b.* An *unfavourable* opinion should be formed, if any of the

more dangerous symptoms enumerated above supervene (§ 393.); especially if the skin be either early or deeply yellow, or the sensorial functions early disturbed; if the period of exhaustion be attended by deep redness of the face, dulness of the eyes, much anxiety, or laborious respiration; by a feeble, creeping, or intermitting pulse; by very scanty and dark urine; great pain, tension, or fulness in the epigastrium and hypochondria; difficulty of swallowing; tremors of the tongue or of the extremities; by startings of the tendons; involuntary discharges of feces, particularly if they be of a black colour; incessant vomiting, especially if the egesta be dark, or great in proportion to the ingesta; by petechiæ, enlargements of the parotids, and coldness of the extremities.

401. *v.* TREATMENT.—The indications are—1st. To evacuate morbid secretions in the prima via, and restore the suppressed perspiration, in the stages of premonition and invasion;—2d. To moderate the vascular reaction attendant upon the period of excitement;—3d. To obviate determination to a vital organ, and mitigate urgent symptoms;—and, 4th. To support the vital powers in the consequent exhaustion.—The first indication is best fulfilled before reaction is developed. At this time an *emetic*, followed by diluents, by the *vapour bath*, or by *fomentations, sudorific drinks*, and by warm emollient enemata, will generally restore the suppressed perspiration, and moderate the consequent reaction.—*Bloodletting* is the next important means; but the utmost care should be taken not to resort to it before reaction has commenced, or when exhaustion is about to supervene. Dr. DENMARK has insisted upon this, and my experience fully confirms the propriety of the advice. I have seen this fever most remarkably exasperated, and almost fatal syncope occasioned, by the abstraction of even two or three ounces of blood during the stage of invasion, before vascular excitement was developed. When this pathological state has supervened, depletions should be energetically and early practised, but with due regard to the state of the pulse, and to the complications and other circumstances of the case; and they ought to be aided by cold applications to the head, and purgatives. A full dose (from 10 to 20 grains) of calomel may be given immediately upon the first bloodletting, and afterwards the tartrate or citrate of soda or of potash may be taken, at short intervals, in the state of effervescence, with an excess of the alkali.—As long as vascular excitement is energetic, antiphlogistic remedies should be employed, as recommended above; and, in addition to those now mentioned, there are none more deserving of adoption, than small and frequent doses of the nitrate of potash and muriate of ammonia. Cold affusions, and cold spongings of the surface, are also useful auxiliaries. When internal viscera are oppressed, and reaction is not free and open, the tepid bath, or tepid affusions, will be serviceable.

402. The *second indication* is to be fulfilled by local depletions, in the first instance, followed by rubefacients, blisters, and the other means detailed when treating of the remittent form of bilious fevers (see § 251, 252—258.).—The *exhaustion* in the latter period requires the same

treatment as already advised for this state in the severer forms of remittent and inflammatory fevers (see § 253, 256, 257.).

403. The *mercurial plan* of cure in this fever has been very strenuously insisted upon by CHISHOLM, DENMARK, J. JOHNSON, BOYLE, BURN, and various other recent writers. They advise *calomel* to be given after copious vascular depletions, with the intention of affecting the system, and in various forms of combination—with James's powder or other antimonial preparations, in frequent doses, or in larger quantities with opium. And they direct the mercurial unguents to be used externally at the same time. I have prescribed mercurials with the same intention, to the utmost extent, and in all these forms, in the more concentrated varieties of this fever in hot climates; but I have not satisfied myself that they have been actually beneficial to the extent supposed, even in the cases which have recovered during or after their exhibition. I would, therefore, prefer to use it in the manner I have advised in the severer forms of remittent (§ 250. *et seq.*).

404. The propriety of having recourse to *metics* in this fever has been much questioned by writers, and especially by those of the school of M. BROUSSAIS. They are, in my opinion, quite inadmissible after excitement has commenced. They should be given only in the premonitory and invading stages, as above stated (§ 401.), but unfortunately the disease seldom comes under treatment until these have been superseded by reaction; and they ought to be aided, in these periods, by the means mentioned (§ 401.) in connection with them. They are contra-indicated even thus early, if great pain be felt at the epigastrium, with distension and tenderness; and if full and free vomiting have already taken place.

405. The *saline treatment*, so remarkably extolled by Dr. STEVENS, in the latter stages of this and other severe fevers, does not appear to have been employed to an extent which will warrant an opinion as to its effects. And, although several years have elapsed since it was so strongly recommended by this writer, for these diseases, I cannot find that any additional evidence of its efficacy has been adduced. It surely becomes this physician to furnish further proofs of its success, and it is morally imperative upon practitioners in warm climates to give it a proper trial.—It is unnecessary to offer further remarks on the treatment of this species of fever, as the observations already made in respect of the management of remittent and inflammatory fever will in a great measure apply to it; and the more so, as the severe states of these diseases, as well as of this, although commencing differently and evincing certain modifications in their early course, generally present very similar features in their advanced stages, or when they assume dangerous complications, and pass into exhaustion of vital power.

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Those who have not seen the fevers incidental to inter-tropical countries, more especially to the West Indies, Africa, the Mediterranean, and the East, may consider the distinctions made above not to exist in nature, and that remittent, billous continued, inflammatory, and pestilential fevers are merely modifications and grades of each other. They may even doubt the utility of the details into which I have entered, particularly as regards inflammatory and bilio-gastric fevers; for they will scarcely observe a case of either in temperate countries, particularly in the severe forms met with in warm climates, unless in very hot seasons, and in peculiar circumstances. But in those parts of the world to which I have

just referred, and in others adjoining them, to which medical men may proceed to serve, it will be found that the unacclimated, according to their constitutions, will be affected by inflammatory fevers of various grades of severity, in healthy localities and in hot and dry seasons—with bilio-gastric and remittent fevers, of various forms, in miasmatic situations and sickly seasons,—whilst the acclimated shall escape the first of these maladies, in the former of these circumstances, and the second in the latter, or, if attacked, they shall experience only remittents or intermittents. The pestilential yellow fever makes no such distinctions. As already stated, and as will be hereafter shown, its spread is limited only by a low range of temperature, by a previous attack, and by circumstances that circumscribe its infection. Whilst the former fevers are met with in all warm climates, and occur either sporadically or endemically in them, and are not infectious, this last appears only on the intertropical shores of the Atlantic, or parts adjacent, during hot seasons, rages for a time, and then disappears. Thus, it occurs after long intervals, prevails sometimes for years, and then takes its departure, as will be shown in another place. When we consider the very different constitutions—original and acquired—of those who inhabit European colonies within the tropics,—when we review the appearances of the new-comer, of the old resident, of the creole, of the mulatto of various grades, and of the negro, and take into account the modes of living, the exposures, and the various other circumstances connected with each class, and further connect all these with variety of situation, season, and temperature,—we cannot be surprised at the very different forms which fever assumes among them.

XIX. MUCOUS OR PITUITOUS FEVER.—**SYN.** *Febris Mucosa, F. Mesenterica*, Baglivi; *Morbus Mucosus*, Roederer and Wagler; *Febris Pituitosa*, Stoll; *Febbre glutinosa gastrica*, Sarcone; *Fievre Adéno-méningée*, Pinel; *Fievre Muqueuse*, Fr.; *Schleimfieber*, Germ.

406. CHARACTER.—*Slight febrile reaction following chills, with mucous evacuations, and pains in the back and limbs, and often with slight remissions.*

407. i. Causes.—This variety approaches bilio-gastric fever on the one hand, and the enteric form of synchoid fever, on the other. It may occur either sporadically, endemically, or epidemically; and, in either case, it may arise from, or pass into, fever of a periodic type. It may even run into dysentery; and, from the severity of the pains in the limbs attending it, may closely resemble an attack of rheumatism. Its characters, both constant and contingent, result from the various circumstances, both intrinsic and extrinsic to the patient, concurring to cause it. These are chiefly—*a.* The epochs of childhood and old age; the female sex; the lymphatic, leucophlegmatic, and nervous temperaments; prolonged watchings; excessive fatigue or indolence; languid, weak, delicate, and pale states of frame; chlorosis, intestinal worms, or a cachectic habit of body; the debility caused by previous disease, as by agues, mesenteric obstructions, or by excessive venereal indulgences.—*b.* Living in low, humid, cold, and marshy places; privation of light and of the sun's rays; the autumnal season, or prolonged wet and cold weather; want of cleanliness; the use of indigestible vegetables, of unripe fruit, of tainted animal food, or of unwholesome fish, particularly shellfish; of stagnant, marshy, or impure water; the privation of accustomed stimuli; the abuse of emetics or of purgatives; insufficient nourishment, &c. The most common of these are cold and humidity, unhealthy localities, and unwholesome ingesta. This fever is *endemic* in the situations just specified; and it has occasionally appeared epidemically during autumn and winter, particularly after much wet

confounded mucous fever with *influenza*; wit *cattarrhal fevers*, and even with *bronchitis*. But more recent observers have, with greater propriety confined their description of it to that form of general affection, which is characterised by slight febrile excitement and nervous depression, with predominant disorder of the digestive mucous surface, of a sub-acute form, accompanied with mucous or slimy evacuations—admitting, however, the occasional complication of bronchial irritation with it.

409. This fever is *preceded* by general uneasiness, by a sense of heaviness; or pains in the limbs, loss of appetite, disturbed sleep, acid or acrid eructations, and cold or chilliness, which is first felt in the lower extremities. To these succeed, marked dislike of food, slight thirst, nausea, sometimes with vomiting of a whitish, transparent, and viscid fluid of a nidorous or acid taste; a sense of weight at the epigastrium, with fulness; flatulent and colicky pains, with slight tenderness in the abdomen, and relaxed bowels. The tongue is usually moist, white, and covered by a mucous coating, with a sickly or unpleasant taste of the mouth; aphthous exudations are occasionally observed on the fauces and lips; the saliva is sometimes abundant; and the breath is fetid and heavy. The evacuations are mucous, more frequent than natural, sometimes tinged with blood, voided with slight tenesmus, and, in children, often with *prolapsus ani*. In rarer instances, costiveness, or an irregular state of bowels is observed;—mucous diarrhoea and costiveness alternating; and, occasionally, worms are voided. The urine is either scanty or natural at first, of a citrine tint, and sometimes passed with pain; it deposits a mucous sediment of a greyish or brick-colour at an advanced stage. The temperature of the surface is not much increased, unless during the evening exacerbations; and, towards the acme and decline, a gentle perspiration breaks out, especially in the morning and during sleep. A slight eruption often occurs during the night, but generally disappears in the morning. The pulse is feeble and small, but seldom much accelerated, unless in the evening and night. The patient complains of a sense of weight or of pain in the sciniput and occiput; with vertigo upon sitting up; of confusion of ideas, and somnolency, without the ability to sleep; of depression, sadness, and restlessness; of pains and soreness in the hypochondria, in all the limbs, and in the joints; and occasionally of cough, noise in the ears, and deafness.

410. iii. The *Diagnosis* rests upon the circumstances connected with the origin of the disease; on the appearance of the evacuations; on the colicky pains in the bowels; on the softness, the very slight acceleration or slowness, of the pulse; on the little increase of the temperature, and the humidity of the skin; on the slight degree of thirst; and on the very moderate or sub-acute character of all the febrile phenomena. In its slighter forms, the complaint is commonly described as fever from cold, or as a cold in the bowels and limbs. In some cases, it presents either a dysenteric or a rheumatic character; and is with difficulty distinguished from dysentery, or from rheumatism in other instances, unless the history of the disease, and the state of the bowels and of the evacuations, be closely observed. It

408. ii. Symptoms.—Some of the older writers

may even pass into either of these affections, or into others about to be noticed.

411. iv. The *Duration* of this fever varies from two to five or six weeks. It often presents slight remissions, indicated chiefly by the pulse and skin. The more manifest the remissions, the longer is its duration, which may be extended even beyond the latter period.—*Relapses* are very common during convalescence; and are caused chiefly by errors of diet or of regimen, by premature exposure to atmospheric vicissitudes, or to cold and moisture, or to paludal exhalations. The relapse may assume either the same or aggravated features, or a purely remittent or intermittent type.

412. Mucous fever *terminates*—1st, In a return to health, which most commonly takes place; and is frequently preceded either by vomiting, or by a moderate diarrhoea, or by an aphthous eruption on the lips, or by a miliary eruption on the skin, by a general sweat, by the urine becoming copious and depositing a sediment, or by a spontaneous salivation;—2dly, In the adynamic state of fever, with predominant affection of the intestines, and of the brain, or of its membranes;—3dly, In a purely remittent or intermittent type, or in dysentery, particularly in marshy localities; and, in such cases, sub-acute or chronic disease of one or more of the viscera in the abdomen, with or without dropsy, may supervene;—4thly, In unequivocal symptoms of rheumatism, or of peripneumonia;—5thly, In death, after severe inflammatory affection of the intestinal mucous surface, attended by obstinate diarrhoea; or after excessive nervous exhaustion, or after obscure affection of the brain, or of its meninges, or of the respiratory organs.—The *prognosis* is generally favourable, unless any of the more severe changes just mentioned present themselves. This fever seldom terminates fatally when early and judiciously treated.

413. v. *On dissection*, the principal lesions are found—1st, In the *intestinal canal*, which is usually greatly distended by a fœtid gas; its mucous surface presenting inflammatory appearances, consisting of vascular injection, thickening, softening, various alterations of colour, ulcerations, and even gangrene;—2dly, In the *peritoneal covering* of the intestines, which is either partially inflamed or altered in colour, the abdominal cavity sometimes containing serum;—3dly, In the *mesentery*, which often presents lesions similar to those of the peritoneum, the mesenteric glands being enlarged, inflamed, or changed in colour;—4thly, In the *liver and spleen*, which are variously altered in different cases, but most frequently congested, enlarged, or granulated; the spleen being generally softened, friable, enlarged—more rarely small and hard;—5thly, In the *lungs*, which are congested or injected, hepatized, tuberculated, the bronchi being loaded with mucus, and the bronchial glands enlarged;—6thly, In the *pericardium*, which sometimes contains a turbid or sanguinolent serum; the substance of the heart being flabby or soft.—Morbid appearances, consisting chiefly of congestion and effusion of serum between the membranes or in the ventricles, are occasionally observed in the brain. In every instance, the *digestive mucous follicles* have been found enlarged, inflamed in various degrees, and ulcerated; presenting the

various lesions, affecting these follicles, described in the article *DIGESTIVE CANAL* (§ 36.); the cæcum, large bowels, and small intestines, being the parts chiefly diseased.

414. vi. *Treatment*.—SELLE, STOLL, and J. P. FRANK, looked upon the character of the stools as the consequence of accumulations of mucus in the digestive canal, and have prescribed emetics and purgatives in order to evacuate them. BAGLIVI more judiciously directed vascular depletions, emollients, and mild purgatives. PINEL first evacuated the stomach by means of ipecacuanha; and either continued this substance afterwards, in weak aromatic infusions, or gave rhubarb with the tartarate of potash, or with the muriate of ammonia. He occasionally directed three or four grains of the extract of jalap in an emulsion, as recommended by ROEDERER and WAGLER. BROUSSAIS and his disciples, viewing this fever as a form of primary *gastro-enteritis* developed under the influence of cold, humidity, and bad diet, in persons whose mucous surfaces are predisposed to inordinate secretion, and who are liable to sympathetic affections of the limbs, head, &c., advise a treatment founded on these views. They believe that collections of mucus in the *prima via* are not the cause of the constitutional disturbance, but are, equally with such disturbance, produced by the inflammatory irritation of the mucous surface. There can be no doubt of the frequent origin of the morbid secretion in this state, but that it always, or solely, originates in it, is questionable. Although inflammation, or rather vascular injection, of the mucous membranes is one of the constituents of the morbid condition, there are obviously others which modify it, or give it a more or less specific character. Besides, the follicles are more affected than the mucous membranes themselves; and however prominent the affection of these parts may be, the organic nervous system is manifestly that which is primarily impressed by the causes, and which continues longest and most universally to evince disorder.

415. a. The *first* intention is to remove the exciting causes; and, if the disease comes under treatment sufficiently early, to endeavour to arrest its progress, or to shorten its duration, by the exhibition of an emetic of ipecacuanha, by the vapour bath, by hot fomentations, and by warm emollient injections.—b. The *second* indication is to reduce vascular action, if the disease be fully developed, or the patient plethoric or robust, and if febrile excitement be considerable, by general or local bloodletting, in moderate quantity, by refrigerants, by the tepid bath, and by low regimen.—c. The *third* intention is to determine the circulation to the surface, and derive from the mucous surfaces by means of DOVEN's powder, or by ipecacuanha, nitre and opium, or other diaphoretics; by the warm bath; and by blisters, sinapisms, or warm terebinthinate epithems applied over the abdomen.—d. The *fourth* object is to soothe intestinal irritation and to correct the secretions, by emollients and demulcents given by the mouth or by injection; and by small doses of blue pill or hydragrym cum creta and camphor, with DOVEN's powder.—e. The *fifth* is to evacuate morbid matters from the intestines, and to prevent their collection, by the occasional exhibition of mild purgatives and

laxative enemata. — *f. Sixthly*, to alleviate urgent symptoms, or determinations to particular organs — as to the head, the lungs, or liver — by local depletions, external derivatives, rubefacients, &c. — *g. And, seventhly*, to support the powers of life in the latter period by gentle tonics, light nourishment, and by cinchona or the sulphate of quinine, especially when the disease presents remissions, or is disposed to pass into the periodic type, or into rheumatism, and particularly in humid, marshy, and unwholesome situations. I have found the following aperient very serviceable in this form of fever, when the bowels required to be gently but freely evacuated. Others, however, in the APPENDIX (F. 266. 430. 827.), will equally be useful.

No. 262. R. Potasse Supertart. in pulv. 3j; Potasse Nitratiss 3i.; Confect. Senne 3j.; Syrup. Aurantii 3i. M. Fiat Electuarium, cujus capiat Coch. i. vel ij. minima.

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XX. FEVER, SWEATING. — *SYN.* *Miliaris Sudatoria*, *Sudor Miliaris*, *Miliaria* (from *milletum*, a millet seed), *Sudor*, *Sudor Anglicus*, *Sudor Picardius*, *Febris Sudatoria*, *F. Helode Sudatoria*, *Sudatio Febris Helodes*, *F. Miliaris F. Vesicularis*, *Purpura alba*, Auct. var., *Miliaris*, *Sauvages* and *Sagar*; *Febris Purpurata*, *F. Hoffmann*; *La Suette*, *La Suette Miliare*, *La Suette Epidémique*, *Fièvre Miliare*, *Pujol*, *Gastellier*, *Menière*, &c.; *Der Friesel*, *Germ.*; *Miliary Fever*, *Sweating Miliaria*, *Sweating Sickness*.

416. DEFIN. — After lassitude and general weakness, a sudden attack of febrile disorder, with most profuse and continued sweat, frequently followed by an eruption of miliary vesicles, the disease occurring epidemically and being infectious.

417. I have preferred the name *sweating fever* to that of *miliary fever*, as sweating is the constant and characteristic phenomenon of the disease, and is present in the mild, as well as in the most malignant cases; whereas the miliary eruption is sometimes wanting in both. This malady should not be confounded with the febrile affections of lying-in women, attended by sudamina, that have improperly been denominated miliary fever, from the character of the eruption sometimes occurring as a symptom of them, during hot seasons and a too heating regimen. This is a specific fever, seldom observed in modern times, in this country, although frequently prevailing epidemically in many parts of Continental Europe.

418. i. History. — The epidemics which have been variously denominated, as stated in the *Synonymes*, have manifestly been modifications of the same disease, caused by the varying circumstances connected with its appearance. — The epidemic sweating sickness, which appeared between 1485 and 1528, and which ravaged England in these and several intermediate years, was evidently, as supposed by *MM. Ozanam* and *Rayer*, a most violent form of this malady, in which the sweat was the most prominent symptom, and the progress most rapid and acute. But many cases noticed by *Boyer* and others, in recent epidemics, were similarly characterised. — (a) The epidemics observed in France by *Rivierius*, during 1618; in Germany by *Welch* and *Langius*, in 1652; in Frankfurt in 1653; in Augsburg in 1660; in Bavaria in 1666; in Holland by *Grunwal*, in 1666; in Hamburg in 1675; in London and in Edinburgh, towards the end of the seventeenth century, by *Hamilton* and *Sibbald*; in Saxony in 1694; in Hungary in 1697; in Plymouth by *Huxham*, in 1738; in Normandy by *Le Pécquer*, in 1740; near Mantes by *Quincy*, in 1750; in Navarre by *Augustinus*, in 1755; in Bayeux from 1769 to 1776; in Piedmont by *Allioni*, in 1758, and by *Damilton* in 1782; and in Toulouse and the vicinity by *Gallat du Plaisis*, in 1781; were essentially the same disease. In all these, the fever was ushered in by chills, horrors, and other premonitory and invading symptoms, which were soon followed by pains in the head, loins, and limbs; by nausea, flushing, profuse sweat, dyspnoea, and, about the third day, by a miliary eruption. Numerous other epidemics that have presented this form of eruption as a prominent symptom, have been described by writers, who observed them during the two last centuries. But in these it was apparently caused, either by a too heating treatment and regimen, or by the neglect of evacuations during the early stage of the disease; and it was not always connected with excessive sweat. It was, indeed, in most cases merely a symptomatic eruption appearing at an advanced period, in a similar manner to petechiae, &c., with which it was even sometimes associated. In the epidemics, however, which I have above enumerated, the eruption was not a consequence of neglected evacuations, nor of a heating regimen, for the treatment was generally depletory and cooling, and it occurred earlier in the disease, although always preceded by profuse sweat, which was coexistent with the vascular excitement, and always peculiar and offensive. So thick a vapour generally surrounded the sick, arising from the excessive perspiration, that the flame of a candle was obscured by it.

419. (b) The epidemic occurrence of sweating fever in various parts of Picardy was first noticed in 1718. Since that time it has frequently appeared in that province, and in other parts of France; and has more nearly approached, than the epidemics noticed above, the characters of the sweating sickness of the 15th and 16th centuries, in respect of the rapidity of its course, the profuse sweat, and the frequent absence of the miliary eruption. The sweating fever of Picardy appears to have prevailed more or less in various parts of this province and of Flanders, from 1718 till 1747. In this year it appeared in Paris; and

was described by BELLOT, MALOUM, and BOYER. In various seasons, cases equal in severity to those of the terrible sweating sickness of the 16th century occasionally occurred. These writers observed some that ran their fatal course in fifteen hours, although more generally death did not take place until the third, fourth, fifth, or sixth day, or ever later. When patients passed the seventh day, they generally recovered.—The most robust were the most violently attacked; children and the aged generally escaped. Irruptions of this form of the disease occurred in various parts on the Oise, in 1747; at Beauvais in 1750; in several parts of the north of France in 1753; and in the environs of Amiens in 1758. (MEYERER, VANDERMONDE, &c.) The chief peculiarities of these epidemics were a frequent occurrence of hæmorrhages, and of severe and complicated cases, often terminating fatally at the end of one or two days. Robust persons were the most severely attacked in these as in other epidemics. Females often experienced menorrhagia in the course of the disease; and hæmorrhages occurring on the third or fourth day were generally fatal. The sweat was frothy, or putrid, as likewise was the air expired by the patient. Bloodletting was employed at the commencement in the more robust and plethoric; at an advanced stage it was most injurious. Emetics, cooling aperients, acidulated drinks, refrigerants, &c. were also prescribed; and at a later period the preparations of cinchona, the decoction of contrayerva, camphor, &c. These were found the most successful remedies.—The epidemic of Saint Quentin, in 1768 and 1769, was generally ushered in by slight chills, rapidly followed by great heat, thirst, pains, and other symptoms. The treatment just described was most commonly employed. Since then, several other irruptions of this fever have occurred, presenting the phenomena about to be enumerated. That which took place in 1821, and was ably described by M. RAYET, was evidently more asthenic than those above referred to.

420. ii. *Symptoms*.—Individual cases of this fever are very much modified, even during the same epidemic, by the prominent affection of different organs, in different persons. To this circumstance is to be imputed its great diversity, as to severity and character, even in the same family and in similar circumstances. M. RAYET, however, divides it into two forms, the *mild* and the *malignant*; but it is obvious that intermediate grades are equally common; and that most of the malignant or severe cases, are rendered such by local complications.—(a) In the *milder* form, patients frequently complain of lassitude, loss of appetite, and pains over the eyes. Sometimes they feel the gradual accession of fever, and as if a vapour were extending over their limbs, until it amounts to burning heat, and more generally constriction about the epigastrium, for a very short time before the *hot vapour* is exhaled in the form of sweat from the surface. Occasionally persons have gone to bed apparently well, and have awaked bathed in sweat, which continued till their recovery or death (RAYET). The tongue is covered with a white, foul, or, more rarely, a yellow fur; and the mouth is clammy. There is more or less thirst, no appetite, and the bowels are constipated throughout the disease. The urine is scanty. Respiration is oppressed, and the head aches.

The pulse is slightly accelerated, but becomes more frequent at the period of the eruption; and is commonly full and soft. This state continues through the second, third, and fourth days; on which, but commonly on the third, a slight sensation of tingling is felt, followed by a miliary eruption on the skin. The eruption appears first on the neck, and spreads, either rapidly and generally, or slowly and partially, to the breast, sides, trunk, and insides of the thighs, legs, and arms. It may, however, come out suddenly as well as in succession, and be distinct or confluent. The vesicles which constitute it are the size of millet seeds, diaphanous or pearly, and are easily felt by the fingers. They are often intermixed with red papulæ; and more rarely, bullæ appear on some parts of the body. In about two or three days they dry up, and are followed by a desquamation of the cuticle.—The sweating is much more constant in its occurrence than the eruption—is always present, is remarkably profuse throughout the disease, especially before the eruption has become general, as it afterwards is somewhat diminished; and is attended by a peculiar odour, which RAYET, SCHAU, and HESSENT compare to that of rotten straw, and M. MENIÈRE to that of water impregnated with chlorine, or to that of the stools of patients in cholera. LE PÈRE-D'ACLO says that it has a rotten-sour. The surface is hot, and more or less red. The sweat, rarefied by the heat, forms a cloud around the patient, that is condensed, and falls like fine rain or dew upon the bedclothes. The dyspnoea seems to depend upon congestion of the lungs and large vessels, and is referred chiefly to the præcordia or to the epigastrium. The headach may be suborbital or general; it is dull, heavy, and depressing, and seems not to be altogether the result of vascular determination, or congestion of the brain. In this form, the abdominal regions present nothing particular. The symptoms decline by degrees, and rarely continue longer than fourteen days: they commonly disappear about the eighth or tenth day.

421. (b) The *severe, complicated, or malignant* form is generally sudden in its attack as well as the mild; but lassitude and want of appetite usually precede it for some days. The principal symptoms of invasion are, sometimes chills or horripilations, and commonly vertigo, violent headach, nausea, efforts to vomit, flushed countenance, urgent dyspnoea; pain in the epigastrium, loins, and limbs; anxiety; throbbings of the arteries, and most profuse sweat. Either the cerebral, or the thoracic, or the abdominal, symptoms predominate in different cases, and give rise to distinct complications. Where the head is more especially implicated, delirium, coma, and convulsions are often present, and soon terminate life. In these, the patient first complains of vertigo, severe headach, nausea or vomiting, flushed face, injected and starting eyes, epistaxis, throbbing of the carotids and temporal arteries, &c., and soon becomes delirious and comatose. In rarer instances, the *spinal chord* and its membranes are particularly affected, the patient complaining of painful tension in the course of the spine, with tetanic rigidity or spasms of the voluntary muscles. When the *lungs* are chiefly affected, there is often deep-seated pain in the chest, great dyspnoea, a short and quick respir-

ation, the crepitating rattle, or a blowing noise in some of the lobes of the lungs, diminished sonorousness of the chest, a full and frequent pulse, and bloody expectoration or hæmoptysis, indicating inflammation or inflammatory congestion of the respiratory organs. When the *digestive organs* are predominantly diseased, the patient complains of an acute constrictive pain in the epigastrium, with urgent anxiety, frequent sighing, a sense of suffocation, or of weight in the chest, and an unusual pulsation in the region of the stomach. These appear from the commencement, are exacerbated at intervals, and are most severe just before the eruption. In others, the symptoms indicate affection of the bowels, with constipation; and in some, severe pains are felt in the hypogastrium, with scanty, high coloured urine, and difficulty in voiding it.—This violent form of the disease may prove fatal in twenty-four or forty-eight hours, or in three or four days; but it commonly runs its course in from one to two weeks in favourable cases; sometimes, however, extending beyond three weeks. During convalescence, debility is its chief consequence, secondary affections being rare. Those that do occur, are gastro-intestinal disorders, and the eruption of boils.

422. *The alterations of structure* have been imperfectly observed.—When a fatal result has been preceded by anxiety, pain, or burning in the epigastrium, the mucous coat of the stomach and duodenum has been found much injected. In the cerebral complication, the brain has been found congested, the membranes injected, and the ventricles filled with serum. In the pulmonary complication, congestion of the lungs, and hepatization of portions of it, have been remarked. Although epidemic visitations of this disease in France have been frequent in modern times, and fatal cases very numerous, yet its pathological anatomy has been very imperfectly investigated. It is evident that death is caused chiefly by the severity of the complications accompanying it.

423. iii. *Diagnosis*.—The constant, the profuse, and the peculiar sweat attending the disease from the time of its development, not only characterises it, but distinguishes it from all other fevers. The severity of the complications in the intense form, especially at the time of attack, and upon the appearance of the eruption, the character of the eruption, the epidemic prevalence of the malady, and its infectious nature, further serve to distinguish it. The descriptions of the *sweating sickness* by CAIUS, WILLIS and others prove that it was a more intense form of this disease than has been lately observed. The characteristic symptoms of the former all exist in the latter; and, although the eruption is not mentioned in the sweating sickness, this appears not to have been a general symptom in recent epidemics. M. RAYEN states it to have been wanting in a great number of cases, in the epidemic of 1821; and M. MENIÈRE makes a similar remark as to that of 1832.

424. iv. *Prognosis*.—Sweating fever, as observed in modern times, is a mild disease in its simple form. Predominant affection of any internal organ will render the prognosis unfavourable, according to the severity of such affection. However alarming the symptoms, if they decline

upon the appearance of the eruption, a favourable issue may be anticipated. M. RAYEN states that, in 1821, the eruption was independent of irritation of the stomach; that it was confluent without violent previous pain in the epigastrium or nausea; that it did not always succeed the most profuse and incessant sweat; and that it did not invariably appear in cases where the gastro-intestinal disorder was the most remarkable. Death was often sudden—more unexpected than in the common eruptive fevers,—and often followed upon shrivelling of the vesicles. The greatest number of deaths occurred in 1821, between the ages of 23 and 33. The mortality in males was one in thirteen; and among females, one in twenty-eight. In the earlier epidemics observed in Picardy, the mortality was very much greater than this. It was greatest at the beginning and decline of the epidemic; and among bakers, smiths, and farriers: but was variable in different townships. The epidemic of 1832 was in many instances followed by pestilential cholera. The latter malady often followed the decline of, or convalescence from, the former, and even occasionally appeared in its course; the mortality being thereby much increased.

425. v. *Causes*.—The theatre of the epidemic of 1821, was bounded by extensive forests. M. RAYEN states, that the disease is endemic in some situations; and that it may occur sporadically where it has prevailed epidemically. It has been observed only between 43° and 60° North latitude. Moist and shady places, excessive heat, and an atmosphere surcharged with electricity, seem to favour its irruption. No age gives immunity from an attack; but adults and females are most obnoxious to it. M. MENIÈRE states, that many of those who had the disease in 1821, were again attacked, and died of it, in the epidemic of 1832. When once engendered, it spreads by infection, in the same manner as typhus, scarlatina, and measles. Unhealthy situations, and the poor in the vicinity of the place where it first appeared, suffered in proportion to their proximity, during these two epidemics. M. MENIÈRE remarks that, of the numerous epidemics which have occurred in France, and in other countries, since 1718, to the present time, there is none which shows its origin, either in marsh exhalations, or in unwholesome food.

426. vi. *Treatment*.—Isolation, temporary migration, and avoidance of the affected, are the only preservative means that can be depended upon in this malady.—The *mild states* require but little aid; and it is doubtful if medical treatment will either shorten or alleviate the attack. In the *severer forms*, and where some internal organ is especially affected, appropriate remedies ought to be employed to guard it from danger. If the affection of the head, or of the chest, or of the digestive organs, be slight, *local depletions* will give relief. If the local complication be severe, general *bloodlettings*, with powerful external and internal derivatives, as blisters, sinapisms, purgatives, &c., will be occasionally used with success. But M. RAYEN remarks, that the cerebral affection, when severe, is often rapidly fatal, notwithstanding the repeated abstraction of blood; and that the nervous phenomena are occasionally independent of actual inflammation.—After the eruption, bloodletting is always injurious; and if

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it be resorted to at an earlier stage, and in large quantity, with the view of cutting short the disease, it may have a fatal effect, but it never will produce the desired result. When the eruption disappears suddenly, dry frictions, *urtication*, *sina-pisms*, *blisters*, and *rubefacient liniments*, ought to be employed to solicit its return. *Sudorifics* may also be employed in this case; but they are seldom useful in other circumstances, as it does not seem advisable to use means to increase the sweat. *SCHÄHL* and *HESSERT* found *cold bathing* and *aspersion* of cold water beneficial at an early stage; and *M. RAYER* observed the pain at the epigastrium, and spasm of adjoining parts, preceding the eruption, to cease after the application of *cold epithems* to this region. *Emollient cataplasms*, *fomentations*, and *clysters*, will alleviate abdominal pain, and dysuria; and the general *warm bath*, the *hip bath*, and frictions of the surface, will have a similar effect, and promote convalescence, particularly if the intestinal or the urinary canal be disordered. In the more recent epidemics, *ippecacuanha* and the preparations of *antimony* were given in the first stage, with the view of rendering the subsequent course of the disease more mild; but this practice was found more injurious than beneficial.

427. The above comprises more than all that *M. RAYER*, the historian of the epidemic of 1821, has advanced respecting the treatment. *TESSIER*, *BOYER*, and *MENIÈRE*, however, state, that full *bloodletting* at the commencement is generally beneficial, and evidently relieves all the urgent symptoms. Indeed, the epistaxis often attending the cerebral affection, the hæmoptysis accompanying the pulmonary congestion, and the character of the gastro-intestinal symptoms, most obviously demand it. They further advise tepid diluents in moderate quantities; gentle anodynes to relieve the insomnia generally complained of; and mild derivatives to favour the eruption, which, when copious, often alleviates the internal affections. *M. RAYER* says no more of the use of *purgatives* in this disease, than if such means were entirely unknown. The writers who treated the epidemics in the 17th, and earlier part of the last century, employed them freely, and were certainly not less successful in their treatment than he. *M. MENIÈRE* advises the milder kinds to be exhibited, in most cases, and especially when the tongue is loaded. When the pulmonary congestion is urgent, he directs full bloodlettings and external revulsants; but he judiciously advises the effect of the former to be sedulously watched during the operation, as a too careless mode of abstracting blood, or a too large quantity, may produce instant and fatal collapse. There is evidently more of congestion than of inflammation in all the internal complications of this disease; and vital or nervous power is more or less depressed: therefore, although free depletions are often necessary, they should not be confided in alone; but *camphor*, *ammonia*, *serpentina*, &c., ought to be exhibited according to the peculiarities of the case, and conformably with the principles explained in various sections of this article. When the eruption appears, means calculated to suppress it, or even to delay or diminish it, should be avoided. Vascular depletions have been then found injurious, and even speedily fatal; and cold applied to the surface is equally

dangerous: errors of diet and regimen are like injurious.

428. *Regimen*.—Patients ought to be deprived of nourishment of every kind, the first four or days of the disease, or even longer. Diluents mild kind, and tepid, should be given in moderate quantity. A little veal or chicken broth may be allowed about the sixth, seventh, or eighth day; and the quantity and consistency of the food gradually increased. Relapses may follow even in diet, or consecutive gastro-intestinal disorder may be induced by this cause. The regimen and other means usually required in epidemic maladies, are necessary in this.

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XXI. **FEVER, SYNOCHOID.** SYN.—*Synochus*, *Auct. var.*; *Enecia Synochus*, *Good*; *Synochus mitior*, *S. Smith*; *Common Continued Fever*.

429. **DEFIN.**—*Languor*, *lassitude*, and *chills*, followed by *vertigo*, moderate vascular reaction, and other febrile symptoms, of a continued type, and regular course.

430. This is the most common form of continued fever in this country. It appears either sporadically or epidemically. In the latter case, it is frequently complicated, or characterised by predominant affection of some particular viscus or part, and thence generally assumes a severer character than in its sporadic form. It often appears in this latter manner from other causes than infection; but, in circumstances favourable to the generation of an infectious effluvia, this may become a superadded or a chief cause, or, indeed, the only cause; but, in this case, the disease which results is some one of the more common forms enumerated under the *typhoid*

species of continued fever.—As, therefore, the causes of *synchoid*, and of these forms of *typhoid* fever, are often the same—their intensity and concurrence producing the more severe states of disease, as well as giving rise to an infectious miasm—the view which is about to be taken of them with reference to the former species, will very nearly serve also for the latter.

431. i. CAUSES.—A. Of the remote causes of the varieties of continued fevers most frequently observed in this and other temperate climates, those which precede the operation of the more effective causes, which are usually internal as respects the economy, and which, from the circumstance of their disposing the system to the operation of these latter causes, have been usually called the *predisposing*, requisite first to be noticed. It is often difficult to determine in what the disposition to be affected by these forms of fever consists, and in what manner it is caused. To say, with many, that it arises from an increased susceptibility, does not advance our information one step, and is merely the substitution of one term for another. Close observation of the circumstances connected with the origin of these diseases will show us, that the disposition to become affected with them is not the result of exactly the same circumstances as favour the appearance of ardent fever. A depressed or weak state of vital power, especially as manifested in the nervous systems, but particularly in that of organic life, seems to be one of the most common causes of predisposition. This is proved by the fact, that perfect health, mental activity and energy, confidence in various means of prevention, the moderate use of tonics, &c., enable the body to resist the impression of the exciting causes, particularly infectious and mephitic effluvia, and that fear of the disease, despondency, the depressing feelings and emotions, fatigue, increased sensibility, disorder of the digestive and assimilating functions, &c., are amongst the most common occasions of these causes taking effect.—But, although diminished energy of the powers of life has a marked influence in favouring the operation of the exciting causes, yet something more is required; and this must be referred to a certain constitution of frame, which is influenced sometimes in a relative manner only by relative causes, and at other times only by positive causes, and which often either resists the operation of the usual causes altogether, or yields merely to the combined action of a greater or less number.

432. A much greater predisposition to be affected by continued fevers exists between the ages of fifteen and thirty-five, than at any other period; the forms of fever being generally of a more inflammatory and acute kind between these ages, and in the sanguine, irritable, and plethoric constitutions; whilst persons past the latter of these ages, and those of a lymphatic, leucophlegmatic, or melancholic temperament, are more liable to experience the lower grades of action. Scarcity, famine, and, consequently, insufficient and unwholesome nourishment, among the lower classes of the community, are the chief causes of the generation and spread of fevers, especially those of a simple, low, and infectious character. Whatever depresses or exhausts the vital and moral energies, exposes the body to the impression

of the exciting causes. The circumstances which produce this effect are fully explained in the article DISEASE (§ 21. 23. 27—36.), and in a previous section (§ 64.).

433. The disposition, also, which is generated by certain epidemic constitutions of the atmosphere and season should not be left out of consideration. A peculiar diathesis seems to be gradually and generally induced by the epidemic influence, whatever that influence may be in respect of its nature; and this diathesis or change of the vital manifestations of the organisation rapidly passes into febrile commotion upon the action of one or more of the exciting causes. The change thus effected in the diathesis, and increased by the impression of the exciting causes, may hence be viewed as the proximate cause, or earliest pathological state, of the disease; and to its continuance or non-continuance after the febrile action is fully developed, is often to be imputed the disposition or indisposition to relapse. This is more particularly the case in respect of the fevers caused by exhalations from the soil and from decayed vegetable matters. Infectious miasms—or the effluvia from the bodies of those in fever—suddenly and remarkably increase the morbid diathesis; but when the resulting disease has been undergone, the morbid diathesis is terminated, and a disposition to a return or relapse is altogether or nearly lost. Although epidemic states of the air thus do not favour relapses of infectious fevers, yet they greatly dispose the system to a first attack upon exposure to the exciting causes, when the diathesis has not been changed by a previous attack.

434. B. The exciting causes of continued fever are upon the whole much better known than the states of the system which dispose to their operation. They are extremely numerous; for whatever interests the vital energy so as to disturb generally its manifestations, and to occasion a morbid reaction, may be an exciting cause of fever.—It is unnecessary to enumerate even the most influential of them, as they are adduced with sufficient details, in the articles DISEASE (§ 55—63.), ENDEMIC INFLUENCES, INFECTION, and in an early section of this article (§ 65.). The chief causes of this class of fevers are—1st. Those which proceed (a) from the soil; (b) from its productions in a state of decay; and (c) from animal matter undergoing decomposition; either of these acting separately, or all of them conjointly;—2d. Animal miasms—(a) from healthy persons or animals crowded together, or confined in imperfectly ventilated situations, and without due regard to cleanliness; (b) from persons labouring under diseases of various kinds in confined apartments; and (c) from one or more persons affected by the disease which the effluvia propagates;—and, 3d. Changes taking place in one or more of the various functions, and which having reached a certain pitch, break out in open fever. Each of these requires a few remarks.

435. a. Emanations from the soil or its productions in a state of decay, are most frequently productive of periodic fevers; but they occasionally also give rise to continued fever, especially during certain states of season and temperature, and in plethoric and robust constitutions. What the conditions are, that occasion the continued, in preference to the periodic, type, cannot

be precisely stated. Extreme ranges of temperature, particularly high grades of it, and humid states of the air, may have considerable influence, as is, indeed, often observed in warm climates, amongst Europeans who have recently removed thither; but, in this and other temperate countries, the continued forms of fever much less frequently proceed from this source alone, than is supposed by some writers. In many places, exhalations from dead animal matter concur with those proper to the soil and its productions in causing fever; and, in this case, the disease assumes a more continued type and a lower grade of action; the circulating and secreted fluids being more remarkably vitiated. There can be no doubt, also, that the particular form and complication of the fever often depend much upon the water in common use, upon the nature of the soil, and upon the exuberance of its products. Water loaded with decaying animal or vegetable matter; rich, clay, deep, low, and absorbent soils, &c.; and the effluvia from putrefying animal matter, are frequently productive, particularly when conjoined, of continued fever, which often assumes a gastric or enteric character.

436. *b. Animal miasms* from a number of persons shut up in small space, in ill ventilated and crowded apartments, and in low and humid localities, as in ships of war, transports, jails, camps, besieged towns, workhouses, &c., will, in favourable circumstances, so contaminate the air with animal effluvia as to give rise to fever, presenting characters of severity in proportion to the extent to which the air is vitiated. Instances of this kind are referred to in the articles EPIDEMICS (§ 12. 17. &c.) and INFECTION, and are adduced by PRINGLE, LIND, BLANE, and by most recent writers on Fever. It is unnecessary to offer any remarks upon this, and the other sources of animal miasms, which act as a poison on sound persons, and occasion fevers, or upon infection as a principal cause of the specific forms of the disease, as they are fully illustrated in that article.

437. *c. That changes may take place spontaneously in one or more of the functions, and proceed to the extent of giving rise to the worst forms of fever, appears to be fully proved.* The chief causes of these changes seem to be protracted or excessive mental anxiety and depression, loss of property, disappointment, wounded pride, humiliating occurrences, &c. These causes, however, often concur with the predisposition arising out of disorder of the digestive and assimilating functions, especially when such disorder is connected with coliculus on the *prima via*, and a torpid or loaded state of the biliary organs; and are reinforced by exposure to cold, insufficient nourishment, changes in the usual modes or habits of life, want of sleep, and exhalations from the soil, &c.

438. *C. Determining influences, &c.*—There are numerous causes which, although often insufficient of themselves to produce continued fever, are remarkably influential in giving rise to predominant affection of particular organs, in modifying its form, or increasing its severity. Several of the exciting causes, moreover, have the power not only of occasioning the disease, but also of determining its type, form, and character. This is the case more especially with the effluvia proceeding from an infected person. It is im-

portant to attend to these circumstances, more especially such as determine the nature of the complications, &c. of fever, as a due reference to them guides the practitioner to an appropriate plan of cure.—*Epidemic constitutions* are most influential in thus forming the kind and state of fever (see EPIDEMICS). Next to these are season and temperature; climate and situation; famine; the contingencies of war; employments and avocations; habits and modes of living; mental exertions and moral emotions; and previous disorder of some one or more of the internal viscera.

439. *a. During cold and dry seasons*, the more inflammatory, or sthenic, forms of fever, and pulmonary complications, are observed. In high ranges of temperature, and in those conjoined with humidity, the digestive mucous surface and liver are inordinately affected, and the period of increased excitement soon passes into exhaustion, with marked change in the circulating and excreted fluids, and often in the soft solids.—*β. Climate*, according to its temperature and humidity, exerts similar effects. The situation, when elevated very far from the level of the sea, has a similar influence to cold and dry seasons; but when it is low, confined, or near the sea, rivers, or lakes, the disadvantage of humidity, and the contingent evils of marsh exhalations, tend to aggravate the type, or to complicate the disease. The quality of the water has a remarkable influence, both in generating continued fever, and in determining its form; putrid water, or water containing decayed vegetable or animal matter, generally causing fever of an adynamic, gastric, enteric, or mucous character.

—*γ. Employments and avocations* may either prevent or favour attacks of fever. Tanners and workmen exposed to the fumes of pitch, tar, chlorine, &c., are rarely affected, even when fever is epidemic. Persons much exposed to the open air, and vicissitudes of weather, are most liable to fever of a sthenic or phlogistic kind, and to the pulmonary and pleuritic complications.—

—*δ. Habits and modes of living* are very influential and powerful determining causes of fever, even in this climate. The influence which full and rich living, and its opposite, poor and unwholesome living, exert upon the state of the disease, has been sufficiently manifested by the epidemics which have prevailed at various times in Ireland since the commencement of the present century, according as they appeared in the poor and ill-fed, and as they extended to those in easy circumstances. In the former, fever usually assumes the common continued, or the milder adynamic and typhoid forms, often attended by the pulmonary complication, or with petechiæ, &c., and frequently passing into dysentery, &c.; in the latter class, it is either accompanied, at an early stage, with high action, or with congestion, and predominant affection of the head, liver, or stomach. In persons living chiefly upon fish, it generally assumes a low and putrid character. Those who are intemperate, or who have resorted to spirituous liquors on the invasion of the disease, present especial disorder of the brain and digestive mucous surface.—*ε. Intellectual exertion*, mental anxiety, and other inordinate emotions, may both occasion a severe fever, and aggravate its intensity, even when arising from infection; and, in both cases, a cerebral or typhoid complication, of a dangerous

kind, is produced. — *ζ.* Previous disorder heightens the severity of the disease, and necessarily determines its predominant features or complications, although sometimes in an indirect manner. Thus, it is common to observe bronchitis previous to, or attending the invasion of, fever, followed by a remarkable affection of the brain and of the mucous membrane of the intestines. In this case, the changes effected by respiration on the blood are imperfect; and, consequently, this fluid becomes morbid, — disordering first the functions and ultimately the structure, of the digestive mucous surface and brain.

440. *ii. Description.* — Common continued fever occurs in a simple and complicated form, presenting various grades of severity; the severe and complicated states passing into, or becoming identified with, varieties of the adynamic species. The severe states of common fever have been very generally imputed to its complications with inflammation of internal parts; but, although its complications are necessarily severe, yet it may be equally so without any evidence of local or predominant affection. This, however, is seldom the case. — I shall, therefore, first describe the simple form; and afterwards the more usual complications and states of severity.

441. *A. Simple Continued Fever* — *Simple Fever; Mild Synchus; Synchus mitior* is usually preceded by the symptoms described above, as constituting — *a.* The precursory stage (§ 34.), especially by lassitude, and a general feeling of uneasy debility, and mental languor. The countenance is pale; the features sharpened, dejected, or anxious; and the pulse weak and small. — *b.* After an indefinite period, varying from two or three, to several days, irregular chills, rigors or shivering, commonly alternating with transient flushings or feelings of heat, are experienced, with the symptoms characteristic of the period of invasion (§ 35.). This stage is seldom attended by any actual coldness of the surface, particularly after it has continued a short time; the chilliness being accompanied by increased heat, constriction, and dryness of the skin. — *c.* With the disappearance of the chills, the period of reaction or of excitement (§ 36.), and all the phenomena associated with it, supervene. The vertigo, pains of the head, back, and limbs, and restlessness, usually present in the preceding stage, are increased in this. The patient complains of mental confusion and inability; of general uneasiness and restlessness; the countenance becomes full and flushed; the tongue white, foul, loaded, or furred; the heat of surface generally rises above 100°, and the pulse and respiration are fuller, stronger, and more frequent than natural; the pulse being commonly from 90 to 100 or 105 beats in a minute. The fever is now developed, and proceeds, as described above (§ 36.), usually for several days, — its duration varying from two, three, or four, days to as many weeks, until it either subsides in consequence of the treatment adopted, or passes off by means of some critical evacuation (the period of crisis), which most frequently occurs on one of the critical days, from the 3d to the 21st day from the time of invasion, or that in which chills or rigors were first felt. The stages of decline and convalescence commonly advance in the manner stated above (§ 41, 42.).

442. This mild form of fever generally termi-

nates favourably, even when left to nature; but it may become complicated in its course, or pass into a state of dangerous, or even fatal, exhaustion towards the end of the second week, particularly in weak, aged, and exhausted persons. The return of the healthy functions is indicated — *a.* by the subsidence of the prominent morbid actions; — *b.* by the appearance of critical evacuations; — *c.* by a quiet and prolonged sleep, out of which the patient awakens refreshed, and partially restored; — and, *d.* by the other phenomena already enumerated (§ 41.), as indicative of a gradual decline of the disease. The transition to a severer form of fever is commonly owing to the occurrence of a predominant affection of the respiratory surfaces, or to the change induced in the circulating and secreted fluids, or to the affection of the digestive mucous surface, or to the circulation within the head.

443. *B. Severe or Complicated Synchoid Fever* — *Synchus gravior; Severe Synchus* — occurs from the same causes that produce the milder disease, either acting with greater intensity, or aided by additional circumstances. — The several stages may present a more severe affection of all the functions, than has been now described, without any very predominant lesion of a particular organ; but much more frequently some important viscus betrays increased disorder, generally of an inflammatory or disorganising kind. Yet this predominant lesion is not altogether identical with inflammation — certainly not with the inflammation primarily affecting healthy persons. It is less acute or intense as respects the symptoms attending it, more asthenic as regards the state of constitutional power, and more diffusive and sub-acute in its character, than common phlegmasia. It partakes of more of the features of the erysipelatos than of those of common or pure inflammation. Even when the local affection is more than usually phlogistic in appearance, still it is most important to recollect, especially as respects the treatment, that it is preceded and attended by a more or less severe constitutional disturbance, by lesion of the various manifestations of life, and by a change of the circulating and secreted fluids, — circumstances arising out of the poisonous influence of the febrile cause, and imparting the peculiar characters to this affection, — changing it from the true phlogistic or sthenic inflammatory condition, and determining, accordingly, the consequent lesions (§ 50.). Instead, therefore, of viewing the complication as the cause of the severity of the fever, we should rather consider the intensity of the morbid impression made by the febrile poison, and the resulting consequences, as the principal source of severity and of local affection, aided by the predisposed state of constitution, and of the viscus especially affected. — I shall describe the predominant lesions or complications of synchoid fever, in the order of their usual succession, and of their frequency.

445. *a. Synchoid fever with predominant affection of the bronchi and lungs.* — This is the most common, and generally the earliest, complication, although it frequently exists only in a slight degree. The bronchial surface is often more or less congested and irritated, and the structure of the lungs sometimes implicated. — This complication is not necessarily severe in

proportion to the severity of the fever; but when it is early present, and its symptoms prominent, it necessarily aggravates the fever, and superinduces further complications, by impeding the changes produced in the blood by respiration. That the respiratory organs, particularly the bronchial lining, should be very frequently affected in fever, may be expected from the nature of the exciting causes, and the channels through which they invade the system, as already explained (§ 100. *et seq.*)—the respiratory surfaces being the parts on which the morbid impression is generally first made upon the frame.—In most instances, the predominant disorder of these organs is limited to the bronchial surface; but, in others, the substance of the lungs is also congested; and, in rarer cases, the pleura is at the same time implicated. During particular seasons and epidemics, and in some climates more frequently than in others, this complication is very generally observed. When the bronchial membrane is especially affected, and the symptoms are very obvious early in the disease, it has usually received the name of *Catarrhal Fever*. But the affection of the bronchi, especially when the mucous secretion is not abundant, and still more frequently that of the parenchyma of the lungs, is often nearly concealed by the severity of the cerebral symptoms superinduced by it, or is latent owing to the altered state of the circulating fluids, or masked by some other predominant lesion. This fact, first clearly established by LAENNEC, points out the necessity of having recourse to mediate auscultation, not only in cases presenting the open symptoms of the pulmonary complication, but also in those of considerable severity, and where the sensorium is much disturbed.

446. The *bronchial affection* is generally not very remarkable during the first two or three days; the patient complaining only of a slight oppression or constriction in the chest, with accelerated respiration and occasional sighing. To these succeed, fits of dry cough, wheezing, and, subsequently, the expectoration of a dark viscid mucus. There is often no cough; and the bronchial affection is evinced chiefly by the mucous rattle thus heard more or less extensively upon auscultation, by the disordered breathing, and by the matter expectorated. When the mucous rattle is heard extensively, and particularly if it extend to both lungs, great danger should be apprehended; for the changes induced by respiration on the blood being impeded, this fluid becomes vitiated and induces serious disturbance of the brain, and of the excreting organs and surfaces, ultimately passing into structural lesion. If the affection implicate much of the substance and vesicular structure of the lungs, the breathing becomes hurried, oppressed, or laborious, especially after lying; and the expectoration rounded and streaked with blood. In such cases, the fever is always severe, and attended with much danger, generally in proportion to the extent to which the respiratory surface and lungs are affected. But the danger is not dependent solely upon the pulmonary affection, but also upon the consequences which have been just shown to arise out of it. When, therefore, with the symptoms now mentioned, the edges of the tongue and lips are dark or purplish, and the countenance of a dusky hue, or flushed or suf-

fused with a dark red; when the patient becomes delirious or comatose; the pulse very frequent, soft, and feeble; the abdomen tympanic, or inordinately relaxed; the temperature of the extremities low, or their motions tremulous; and the tongue loaded with a brown or black coating; consecutive pathological states of great danger, owing to depressed vital power, and to contamination of the fluids, then exist.

447. It not infrequently happens, that a severe bronchial complication attends the early stage of this fever; and that, as soon as the blood is so contaminated, and the cerebral functions are so disturbed, as to obscure sensibility, and lower irritability, the bronchial affection becomes latent, and its more obvious symptoms disappear; the pathological conditions which it induced being now most prominent, and proving the immediate cause of an unfavourable result. If, in such cases, we succeed in removing the morbid condition of the blood, by exciting the nervous energy and the functions of excreting organs, the bronchial affection often returns, with the improvement in the circulating fluids and in the nervous functions; but it also often disappears entirely with the other affection of important organs, particularly when critical evacuations terminate the disease. This return of the bronchial affection with the decline of the other dangerous symptoms, I have remarked in several cases; but it may generally be permanently removed by appropriate means (§ 462.). In the progress of this complication, the expectoration, which was at first scanty and frothy or viscid, or altogether wanting, is more copious, of a pale yellow, or yellowish green hue, and gradually diminishes with the decline of the fever. In some instances, it becomes so abundant, as the disease passes its acme, as to favour the resolution of the inflammatory congestion of the bronchi or lungs, and thus to prove a salutary crisis, as remarked by some of the older writers.—When, with dyspnoea and oppression, there are much uneasiness and inability to expand the chest, with a short and quick respiration, active congestion of the parenchyma of the lungs should be suspected; and if, in addition to these, pain be occasioned on coughing, and on full respiration, an inflammatory state, probably extending to the pleura, may be dreaded. In the last stage, the skin is dusky and cool; the pulse is feeble and hurried, more rarely slow and intermittent, the headach passes into incoherent wandering, or low muttering delirium, or coma, but never into violent delirium. When sensibility is early impaired, this complication may proceed to extensive organic change, without having been suspected during life, owing to the imperfect evolution of the usual signs, and to the circumstances already stated (§ 445.). But if the breathing be attentively observed, it will be always found more or less disordered in these cases; and if auscultation be also resorted to, the local affection will not pass undetected.

448. *b. Synchoid fever with predominant cerebral affection.*—This complication may appear early in fever, or at any period of its course. It may be the only prominent lesion, or it may supervene on either of the other predominant affections.—It may be only occasionally observed, or it may characterise particular epidemics; an

it may, moreover, be slight or sub-acute, or remarkably intense, and in all the intermediate degrees.—In the more slight or sub-acute forms, it constitutes the *Nervous Fever* of some writers; and, in the more acute and intense grades, the *Phrenitic* or *Brain Fever* of others.—The former of these very nearly approach, in their pathological states, the nervous variety of adynamic fever, denominated *Ataric* by PINEL, *Neuro-sthenic* by HILDBRAND, and *Typhus mitior* by Cullen.

449. *a.* Common continued fever, with predominant cerebral affection—the *Neuro-sthenic* of HILDBRAND—commences, and proceeds for two or three days, as the simple or mild form of the disease. Either then, or at an earlier period, the patient usually complains of pain in some part of the head, most frequently in the temples and forehead, or in the occiput, extending down the neck. The pain is often constant and severe, but it is sometimes slight or entirely wanting; and it is commonly attended by throbbing of the carotids and temporal arteries, and flushings of the countenance. In those cases where no pain is felt, even upon shaking the head, the cerebral affection may not be less urgent and dangerous: but there is always, in those, a very early and remarkable giddiness, either with or without flushing of the face. Occasionally the pain and giddiness alternate, and the latter is always distressing when the former is absent. The expression of the eyes is either heavy and dull, or morbidly brilliant and animated. The conjunctiva is generally loaded, injected, and suffused, in the former case; and brighter and more glistening in the latter. But the eyes are always more or less sensible to light, the eyebrows contracted, and lids half closed upon exposure to it. Hearing and the general sensibility are also more acute. Noises and light invariably increase all the symptoms. The heat of surface is generally above the natural standard, especially over the head; but it is often not augmented on the lower parts of the body. The patient is watchful and rest-less, and the expression of his countenance indicative of suffering. In the less acute cases, the pulse, the thirst, the appearances of the tongue and of the evacuations, are nearly as in the simple form; and the symptoms generally continue, without alteration, for several days. An important change then occurs. In favourable cases, the slumbings, which were short and disturbed, or attended by a slight dreamy delirium, become quiet, profound, and refreshing. In unfavourable cases, the pain in the head changes to a dull, lethargic state, with a great diminution of the sensibility, and with increased injection and suffusion of the eyes. Delirium, if it have not already appeared, now comes on, attended by moaning or by incoherent muttering, during short and interrupted slumbers; the tongue is loaded, dark, and dry; and the thirst is diminished. In from one to three days, the insensibility passes into coma, unless a favourable alteration takes place; the pulse becomes very quick, and often rises to 120 or upwards; the strength sinks; and the tongue is more dry. To these succeed tremors, rolling of the head on the pillow, tossing of the hands, picking at the bedclothes, and the other dangerous symptoms consequent upon the more acute states of this complication. Even when this

unfavourable change has occurred, a stop may be occasionally put to its progress, although it generally pursues its onward course. A more tranquil and protracted sleep; subsidence of the delirium, or of the tremors, or of the frequency of the pulse; and a cleaner or more moist tongue, commencing at its edges, with an improvement in the appearance of the countenance, and in the state of the skin and of the excretions; are the usual indications of an arrest of the dangerous progress of the disease.

450. *β.* In the more acute states, the cerebral symptoms are severe, and their progress rapid, in proportion to the intensity of the local complication; the headach or giddiness, the intolerance of light and noise, and the general sensibility, being coordinately excessive. The pain in the back, loins, and limbs, is very great; the skin is often intensely hot, and pungent, particularly over the scalp, and is occasionally covered by perspiration, which is rarely copious or general; the eyes are injected, and suffused; the breathing is frequent and suspicious; the patient is anxious, uneasy, and remarkably restless; he rolls the head, and is wholly without sleep. The pulse is at first strong, full, or bounding; but generally devoid of the hardness characteristic of primary or pure phrenitis. Sometimes it is oppressed; and, in the most intense states of complication, it is often intermittent, slow, or not much above the natural frequency. Within four or five days, the pain passes into delirium and insensibility. The delirium is sometimes violent, and is then soon followed by tremors and insensibility; and these by sub-ultus tendinum. The insensibility increases, and passes into a drowsy lethargy; the delirium continuing, but becoming low and muttering. The patient may still become observant, and answer when roused; but coma supervenes, occasionally with rolling of the eyeballs or squinting, dilatation of the pupils, and falling of the eyelids. The tongue is now parched and brown; the gums and teeth are covered by a dark mucous sordes; the evacuations take place unconsciously and involuntarily; the respiration becomes irregular; the pulse either slow, or remarkably rapid and feeble, or intermittent; and life soon terminated.

451. Between these extreme states, there is every grade of intensity, the above symptoms being variously modified. In some cases, the cerebral affection is very insidious, and more or less slow, in others, open, manifest, and rapid. In the former it may be indicated only by giddiness and sickness or vomiting; the pulse in the carotids, and temperature of the head, not being affected. In a case of this description, which lately occurred in my practice (Mr. H. of Fitzroy Market), all the symptoms subsided instantly upon bloodletting.—It may thus exist nevertheless, although in a more protracted form, and present but few of the above symptoms, which, however, are most frequently observed, but not all of them in the same case. The various grades of this complication may be further associated with considerable bronchial affection, or with the disorder of the digestive canal about to be noticed. In such cases, the predominant lesion, either in the head, the thorax, or abdomen, frequently obscures the others, until the treatment, by subduing it, renders them more evident,

or until some one of them acquires additional activity.

452. *c. Synchoid fever with predominant affection of the digestive mucous surface.*—The mucous surface of the stomach and intestines is affected more or less in all fevers, in common with the rest of the organisation. In the simple or mild continued fever, it is generally less disordered than in any other. But in the more severe form, it is often prominently deranged, either at the commencement or at a later period. — *a.* The affection of the *mucous surface of the stomach* is sometimes remarkable from the invasion of the disease. In this case, *retchings*, and *vomiting*, symptoms seldom observed in the thoracic and cerebral complications, particularly the former — are always present, and the fever has hence been denominated by many writers, *Mild Gastric Fever*, from its very close resemblance to the species described above (§ 387.). The rears also pain and soreness felt in the epigastrium, or in the left hypochondrium, and sometimes also in the right, with tenderness on pressure. The bowels are generally costive; the tongue is red at its sides and point, and loaded with a dirty yellowish fur; the pulse is soft, regular, full, sometimes strong, seldom much above 100; and the skin is hot. This state of disease is often followed by cerebral affection, and all the characteristics of that complication; or it passes into the intestinal or enteric form.

453. *β.* The *enteric affection* is sometimes present almost at the commencement of the disease; more frequently it does not appear until a later period; and occasionally it supervenes upon either the cerebral or the gastric complications — aggravating the former, and allaying the latter of these affections. — In most cases, it indicates a severe form of fever, which, at an advanced stage, is further associated with very marked cerebral disturbance. It commonly commences with *looseness*, and with *pain* and *soreness* in the abdomen, especially on pressure. Pain and tenderness are much less complained of when this complication occurs late in the disease, or when the cerebral symptoms are also very prominent. In cases of the early appearance of the enteric disorder, abdominal pain commonly ceases as the fever advances, particularly if the head become also very much affected, even when the purging and other symptoms are increased. The tenderness, however, generally continues much longer. The tongue is at first unusually red at the sides and point, loaded with a dirty white or greyish fur, and moist. As the fever advances, the redness becomes darker and duller, the surface drier, and the fur browner; and at last dark mucous sordes collect on the teeth and lips. The abdomen is commonly soft and natural, but is sometimes hard or doughy. The pulse is at first full, and soft, ranging from 80 to 100; but usually becoming more frequent at an advanced period. Thirst is also present, unless when the head is much affected, and at the last stage of unfavourable cases. When this complication does not evince any improvement in the course of two or three days, it assumes nearly the same features as characterise the worst cases attended by cephalic affection (§ 450.). •

454. When the enteric affection comes on in the course of the cerebral complication, it may

pass unheeded, unless the physician is particularly watchful, and expert in detecting it. In these cases, sensibility is so obscured, that pain is seldom felt, even upon firm pressure; and the bowels are occasionally but little disturbed. The tongue, however, is red at its point and edges, is covered by a dirty fur, and is dry: the pulse is generally about 110, soft, and small. In both these states of enteric disorder, the looseness or diarrhoea is the most frequent symptom. The stools are from three or four to eight or ten in the twenty-four hours; and are at first feculent, fortid, dark, and thin. They subsequently become, in unfavourable cases, watery and of an ochrey hue, — an appearance imputed by Dr. BURNET to ulceration in the intestines. But this result is more common in the enteric complication of adynamic than of synchoid fever.

455. *γ.* The *complications* of the common continued fever of this and other temperate climates, are more frequently associated or mixed, as Dr. SOUTHWOOD SMITH has very judiciously insisted upon, than met with singly. In these mixed affections, however, one or other usually predominates more or less; although cases sometimes occur in which it is difficult to say which is most prominent; or the predominating disorder of an early stage subsides, and is succeeded or obscured by another. Occasionally, also, other complications besides those above specified appear, even in the same epidemic. — *Sore throat*, or *inflammations of the fauces, pharynx, or œsophagus*, or severe affection of the liver, with more or less disorder of the biliary secretion, sometimes accompanies one or other of the prominent affections above described.

456. *iii. TREATMENT.* — In this fever, as well as in all others in temperate climates, the *indications* and *circumstances* stated above (§ 123, 124.), as deserving of especial attention, should be strictly observed. The prevailing epidemic, and the changes that take place in its nature, or characteristic states of vital action, with its progress and with the season, should be carefully studied and made the basis of treatment. Some difficulty may occur at first in coming to just conclusions; but it will vanish with the extent of observation, especially when diligence has been used. The chief points to which the attention of the practitioner will be directed are — the nature and concurrence of the causes, the extent to which they may have affected vital manifestations, the degree of excitement or vascular reaction in connection with nervous power, the state of the circulating and secreted fluids, and the nature and amount of local complications or determinations. The physician who has studied, in an intimate manner, the various phases of disordered vital manifestation, will have little difficulty in recognising the chief characteristics of fever, under the ever-shifting circumstances in which they present themselves, and in appropriating accordingly his method of cure.

457. *A.* The ancients observed carefully the spontaneous changes which take place in fever, and conduced to recovery (see art. *CRISIS*); and they were guided, in forming their indications of cure, by these changes, which they merely attempted to promote or to imitate. This mode of practice may be followed in synchoid fever more successfully, perhaps, than

in any other. Yet it will be better to combine with it the more modern indication, of resorting to such means as may subdue the more urgent symptoms, and avert contingent danger. If the patient be seen as early as the *premonitory* and *invading* stages, the impending disease may be averted by the means advised above (§ 121, 122.)—more especially by *emetics*, warm *diaphoretics*, and the *vapour bath*. But when *excitement* has commenced, the treatment should be antiphlogistic. In this stage, we should endeavour, by a careful examination of the symptoms, to ascertain the existence of local complications; and, having determined their absence, the question will then be as to having recourse to *bloodletting*. I have already considered this topic so fully (§ 128—139.) that nothing further need be here advanced. If the nature of the prevailing epidemic, or the degree of reaction, require depletions, the earlier in this stage they are resorted to the better. But even then they require caution and discrimination. If the excitement be slight, and the patient neither robust nor plethoric, and more especially if the causes and circumstances connected with the origin of the disease be of a depressing nature, they will be better withheld.

458. The exhibition of *emetics* in the stage of excitement was advised by many of the ancients, and practised by some of the most recent writers, although objected to by others. The reason of this difference of opinion is very obvious. There are states, even of this stage, in which they will be of service, and others in which they will be injurious. When reaction is slight—when the patient is not plethoric, has not experienced full vomiting, and does not complain of pain or of tenderness in the epigastrium or hypochondria—then emetics may be exhibited. But if the excitement be great, with determination to the head; and if the patient have already vomited freely, and more especially if the symptoms just mentioned be present, they should not be prescribed. (See § 149.)

459. *Purgatives*, so much decried by BROUSSAIS, and with some justice as respects several states of fever prevalent in France, are certainly of very great service in the common continued fever of this climate, when employed with a cautious discrimination. Early in this disease, calomel, either with or without James's powder, may be given at night, and a purgative draught in the morning. At a more advanced stage, calomel, or hydrargyrum cum creta, may be conjoined with rhubarb. If the stomach be too irritable to retain the more common purgatives, a full dose of calomel will generally be retained; but its action should be promoted by enemata (see F. 140, 144.). During the febrile excitement, and when the bowels are sluggish, the stronger saline purgatives may be given in solution, in small doses, and at short intervals, with refrigerants (F. 440, 441.). The remarks already offered upon this subject (§ 150, 151.) will guide the practitioner as to the choice of purgatives, and the extent to which they should be prescribed. In this fever, especially, it can never be injurious to give them to the extent of freely evacuating morbid accumulations in the bowels, and of promoting the alvine secretions and excretions. When the fæces are very offensive,

greater mischief will accrue from allowing them to remain, even for a short time, in the bowels, than from too active measures in evacuating them.

460. The remarks that have been offered above respecting *refrigerants* (§ 139, 140.), *diaphoretics* (§ 152.), and *diuretics* (§ 153.), are entirely applicable to this form of fever.—The *cold affusion*, which formerly attracted so much more, and now so much less, attention than it deserves, is more appropriate in this than in any other disease. This practice, although resorted to by the ancients and in Eastern countries, was but little known in this until it was employed by WRIGHT and JACKSON. The work of Dr. CURRIE on the subject first brought it into fashion; but now it certainly has not fashion in its favour. When the excitement is fully developed, and the heat of skin above the natural standard, when there is no sense of chilliness, and when the surface is hot and unperspirable, the cold affusion may be employed. Dr. CURRIE directed water of the temperature of from 40° to 60° or 70°, and preferred the hours from six to nine in the evening for its use. In cases of debility, the *cold* or *tepid* affusion is more appropriate. I have resorted to cold affusion over the whole body, in several cases of fever, in a warm climate; but I was not induced by its effects to entertain a high opinion of it. The affusion of cold, cool, or tepid water on the head, when this part is prominently affected, and cold sponging the surface, are more beneficial, and admit of more general application. Dr. CURRIE believed that the general affusion had the effect of lowering the pulse and the morbid heat, of inducing perspiration and sleep, and of cutting short the fever. I have never seen it succeed unequivocally in producing the latter effects; but have remarked that the excitement returned shortly after its use. In the complication with disease of any of the thoracic or abdominal viscera, it should not be used (§ 141.).

418. *B. Of the Complications.*—*a. Predominant affection of the head* has received attention above (§ 165.). What I have there stated is applicable to this complication of common continued fever.—*Bloodletting* is especially requisite, but its amount, and the mode of performing it, should entirely depend upon the symptoms and the stage of the disease.—The *cold affusion* on the head, and *purgatives*, are the next in importance. When the cerebral affection has been preceded or attended by diarrhoea, purgatives should be prescribed with caution. Rhubarb with hydrargyrum cum creta, given so as to evacuate morbid matters, and promoted by suitable enemata (F. 140.), will be then sufficient. When *delirium* is the principal symptom, care should be taken to discriminate accurately the states of vascular action and vital power. If it be unattended by increased heat of scalp, the pulse being very quick and soft, and the countenance sunk or pale, and especially if it have followed intestinal disorder, all lowering agents should be laid aside, and restoratives with opiates, and mild nourishment in small quantities, prescribed. When fever occurs in persons addicted to spirituous or other intoxicating liquors, the cerebral affection is apt to become very severe, and to be attended with delirium and often with

tremor. In such cases, depletions should be used with caution. If tremor, irritability, &c., appear, opium, with or without camphor, should be exhibited. In other respects, the means advised in the article DELIRIUM, according to the pathological states upon which it depends, will be here appropriate. I have repeatedly seen the cerebral symptoms greatly aggravated by the application of a blister to the scalp, at a too early stage of the disease. Blisters should be applied preferably on the nape, but never on the head unless there be profound coma or low delirium with great exhaustion of vital power, as more fully shown in the articles COMA (§ 16.), and DELIRIUM (§ 19.).

462. *b.* The observations already made respecting the pulmonary complications (§ 160—163.) are mostly applicable to those occurring in this form of fever. — *Bronchitis* is the most common affection, and requires the treatment above advised (§ 161, 162.). When the substance of the lungs, or the pleura, is implicated, vascular depletions ought to be early practised. But even in these cases, we should recollect, that bloodletting must be employed with greater caution than in inflammations occurring primarily and in healthy constitutions. It is in this fever, and in its pulmonary complications especially, that antimonials may be given with greatest freedom. After depletions and antimonials have been carried as far as seems prudent, blisters, or other external derivatives, should be used. If the air-passages become loaded with mucus, antimony or ipecacuanha or sulphate of zinc may be given so as to excite full vomiting.

463. *c.* *Predominant affections of the digestive mucous surface* have already received attention, and the treatment there recommended (§ 155—159.) is quite appropriate in these complications of this form of fever. — In the *gastric state* of disorder, particularly when much pain and tenderness, with irritability, exist, local depletions should be early employed; and a full dose of calomel, given shortly afterwards, will generally allay what may remain of these symptoms. Enemata, also, will assist materially in producing this effect, and evacuate morbid matters from the bowels. Small, but often repeated, doses of muriate of ammonia, or of the nitrate of potash with the sub-carbonate of soda; or camphor julap, with the solution of acetate of ammonia, and nitre or spirit of nitric ether; will afterwards be extremely beneficial. Even in this form of fever, but still more in the adynamic, we should be cautious not to be misled by the persistence of pain and tenderness at the epigastrium; or induced to prescribe too frequent or too large depletions with the view of overcoming these symptoms. They may never be removed by these means, however freely employed; for, notwithstanding the arguments of BROUSSAIS for their origin in inflammatory action, I believe that they depend more upon the altered state of the organic nervous sensibility, than upon increased vascular action in the stomach.

464. In the *enteric complication*, the treatment will depend upon the stage of fever at which it appears, and the progress it may have itself made. — Local depletions, external derivatives, and the other means enumerated above (§ 156—159.), are generally necessary. If bloody or

ochrey discharges are observed, especially late in the disease, the terebinthinate medicines, or the superacetate of lead with opium, as advised by Dr. BARDSEY, will be found the most efficient remedies. If the powers of the system become much reduced, gentle tonics, with the chlorates, as the infusion of valerian with the chlorate of potash, and paregoric elixir, will be of essential service. The following medicines will prove of great use in earlier stages of this complication, after local depletions, especially when aided by external rubefacients and derivatives. In slight cases, either of them may be given, according to circumstances; in the more urgent, both may be taken alternately, at intervals of three hours.

No. 223. R. Sodæ Sub-carbon. gr. x.; Potassæ Nitratis gr. viij.; Tinct. Camphoræ Comp. 3j.; Mist. Camphoræ (vel Infus. Valerianæ) 3x.; Syrup. Aurantii 3ss. M. Fiat Haustus, sextis horis sumendus.

No. 224. R. Camphoræ rasæ et subactæ gr. ss.—j.; Pulv. Ipecacuanhæ Comp. gr. iv.—vj.; Hydrarg. cum Creta gr. iij.—v.; Syrup. Simp. q. s. ut fiant Pilulæ ij. vel iij. sextâ quaque horâ sumendæ.

XXII. FEVER, TYPHOID.* SYN. — *Adynamic Fever, Asthenic Fever, Febris Asthenica; Febris Contagiosa; Febris Typhoides; Typhus* (from τυφος, stupor, or τυφω, to smoulder); *Fièvre Typhoïde*, CHOMEL; *Fièvre adynamique, F. nerveux, F. ataxique*, Fr.; *Tifo*, Ital.; *Der Typhus, Nervenfeber*, Germ.; *Low Fever, Contagious Fever, Infectious Fever*.

465. DEFIN. — *After lassitude and general malaise, imperfect or suppressed vascular reaction, with depressed vital power, manifested especially in the nervous, vascular, and muscular systems, and giving rise to changes more or less evident in the circulating fluids and soft solids.*

466. This fever cannot be said to differ specifically from that last described, although certain varieties of it present very marked distinctions. Indeed, the severer forms or complications of synchoid fever very closely approach, or run into, certain states of typhoid fever; the chief differences consisting in the more sthenic vascular reaction in the early part of the period of excitement in the former. Even the milder cases of simple continued fever may gradually assume a perfectly typhoid state, in the advanced stage. The distinctions which characterise the following varieties are results of the *circumstances* already shown (§ 43.) to determine the forms and complications of fevers generally; especially of the constitution and habit of body; of the previous health and condition of vital organs; of the nature, intensity, and concurrence of the causes of the prevailing epidemic; of the influences operating after infection or during the early stages, and of the treatment and regimen then adopted.

467. *A.* The CAUSES of typhoid fevers differ but little from those of the synchoid forms. — *a.* The *predisposing causes* (§ 431.), of both are the same. Although typhoid fevers most frequently occur in persons from 15 to 40 years of age, yet the mortality, in proportion to the number affected, is much less in this than in more advanced periods of life. The predisposition to be attacked diminishes remarkably with advancing age, especially after 50; but the proportion of those who

* I use the term *Typhoid* in the same sense as CYLLEN and the majority of writers on Fever in this country since his time. It is, in this sense, nearly synonymous with most of the names adduced under it.

die increases in a still greater ratio. The predisposition also diminishes as we descend from puberty to infancy, and the mortality diminishes in a still greater ratio. Thus children and aged persons are least obnoxious to typhoid and infectious fevers: a somewhat different law here obtaining from that which characterises the operation of exhalations from the soil upon the human constitution; these latter affecting the young and old as well as the middle-aged, and renewing their attacks in various forms, whilst typhus fever seldom occurs oftener than once in the same person.

468. *b.* The *exciting causes* (§ 434.) of typhoid and synchoid fevers are often the same, excepting that infectious miasms, want and famine, the various contingencies connected with the operations of war, and epidemic influences, are most concerned in producing the *severer varieties* about to be described.—The *sporadic cases* of this fever, and which generally present either the milder form, or most of the nervous character, often originate in the depressing passions, in changes from the usual habits and modes of life, or in exposure to novel influences, physical and moral; in weak delicate persons of a lax habit of body; in persons imperfectly fed, or reduced by previous disease, or by exhausting discharges, &c. From these causes especially proceed the adynamic, slow nervous, or mild typhoid fevers, often observed in persons who have recently removed into large cities, or who live in crowded, low, and ill ventilated apartments.—The *epidemic visitations* of typhoid fever are usually of the more low or severe forms described hereafter.

i. MILD TYPHOID FEVER. SYN.—*Low Nervous Fever*; *Simple Typhoid Fever*; *Simple Adynamic Fever*; *Regular Typhus*; *Slow Nervous Fever*, *Iluxham*; *Typhus mitior*, Cullen; *Febbris nervosa*, Auct.; *Languor Panonicus*.

469. *A.* This form of fever is characterised chiefly by great languor and debility; by giddiness, dulness, and confusion of intellect; by a soft, feeble, and quick pulse; and by loss of muscular power, sleeplessness, and low delirium. It usually commences with similar *premonitory symptoms* (*period of infection*, HARTMANN) to those above described. The patient complains of giddiness, lassitude, uneasiness at the epigastrium, of nausea and loss of appetite, of alternate chills and flushes, and of pain in the back and limbs,—the *period of invasion*. The chills are often prolonged, or recur for two or three days, but seldom amount to rigor. The skin afterwards becomes warm, but seldom very hot—the *period of excitement*, of *irritation* (NAUMANN), of *reaction* (HARTMANN), of *inflammatory irritation* (GOEDEN); the pulse frequent, full, soft, or weak; the countenance dull, pallid, and shrunk, or, occasionally, transiently flushed; the head heavy, confused, and giddy; the eye heavy and devoid of lustre; and the tongue loaded or covered with a dirty mucus. There are more or less thirst; a desire of cold, acid drink; sometimes pain at the epigastrium, nausea, and vomiting; or an irregular and relaxed state of the bowels; and offensive evacuations. Pain of the head is but little, or not at all, complained of, but that of the back and limbs is felt severely. *Tinnitus aurium* is generally present. Febrile uneasiness is great, the restlessness constant, and the want of sleep continued.—About the third, fourth, or fifth day, the head is more affected, and

the mind more confused. The respiration short and quick; and torpor, or *coma vigil*, is often observed. Occasional flushes occur, in some cases, while the extremities are cool. The urine is pale, of a whey colour, or like small beer—occasionally scanty. The bowels are either torpid, or relaxed, or irregular; and delirium, or faintness, partial sweats, tremors, &c. are complained of, on attempt to sit up. Delirium of a low kind, or consisting of a muttering incoherence, occurs about this time; generally, at first, during the night, but subsequently recurring during the day. The eyes become muddy, afterwards suffused or injected; and the tongue of a darker hue, dry or incrustated.

470. From the 7th to the 9th, 10th, or 11th day, the delirium degenerates into stupor—the period of *predominant narcotism* of NAUMANN—the *nervous stage* of HILDENBRAND—the *collapse* of CULLEN and HARTMANN; the pulse becomes small, weak, and very quick, or unequal; the heat of the skin natural, or diminished, or irregularly distributed; the hearing dull; and tremor, the supine posture, coma, and unconscious evacuations, are soon afterwards observed. Petechiæ sometimes appear on the trunk, thighs, &c. The tongue becomes brown or black, incrustated and fissured, is protruded with difficulty, and the gums and lips are covered by a dark sorde.—From about the fourteenth day to a much later period, according to the character of the epidemic, the peculiarities of the patient, the severity of the early stages, and the state of internal organs, a favourable change very often occurs in all the symptoms—the *stages of crisis and decline*, or of *recovery*, (HARTMANN)—and is announced by a refreshing sleep, or by a warm and general sweat, or by a gentle diarrhœa; followed by subsidence of delirium, tremor, &c.; by the tongue being moist and clean at its edges, the skin more natural, and the pulse slower; by returning consciousness; and by the improved appearance of the countenance. If these changes do not take place; or if the sweats are cold and clammy on the extremities; or if they, or the diarrhœa, be unattended by amelioration of the symptoms; a *fatal change* should be dreaded, particularly if profound coma and great deafness, subsultus tendinum, or convulsive or spasmodic movements, difficulty or inability to swallow or to articulate, hiccup, involuntary evacuations, retention of urine, tympanitic abdomen, sliding down in bed; very rapid, fluttering, or intermittent pulse; very black tongue; and a quick, jerking, laboured respiration, or other unfavourable symptoms, appear.

471. *B.* The symptoms which distinguish this form of fever from the synchoid are—the greater prostration of strength from the commencement; the mental torpor and confusion of ideas; the long-continued chilliness, generally without rigor or shivering, at its invasion; the moderate increase of temperature afterwards, or its natural grade; the pallid and shrunk countenance, expressive of suffering and debility; the muddy, lack-lustre eye; the torpor, giddiness, and absence of pain in the head, passing into stupor with delirium at an early stage; the quick and small, or the full, open, and soft pulse, even during the period of excitement; the early dryness, and dark appearance, of the tongue; the remarkable

fœtor of the breath, and of the discharges; the supine posture; the dull, dusky, lurid, or dirty hue of the surface; the frequent occurrence of sloughs in the parts pressed upon, or of erysipelas, and occasionally of enlargement and inflammation of glands; and the early appearance of delirium, with tremor, and other symptoms indicating extreme depression of vital power. When any of these phenomena occur in synchoid fevers, it is always at a far advanced stage; the synchoid thus merely lapsing into the typhoid form, owing to various contingent influences, or to predominant affections of particular organs.

472. *C.* Such are the usual progress and characteristic phenomena of simple typhus; but it presents slight modifications, with the activity of reaction in the early stage, with the affection of particular organs or of the skin, and with the character of the prevailing epidemic. When the predominant affection is either so evident or so influential, as to modify materially the state of disease, certain varieties result, which have been described by authors as specific or distinct forms of fever, and have been often connected, in too absolute a manner, with the peculiar circumstances in which they were observed, or in which they originated. I shall here notice these varieties, with reference to the circumstances whence their peculiarities seem to proceed, and to the various names imposed upon them from a desire of appearing original, but with the effect of proving inaccurate or of causing misapprehension and confusion.

473. ii. *COMPLICATED TYPHOID OR NERVOUS FEVER.*—*A. With predominant Affection of the respiratory Organs.*—The bronchial surface is the part chiefly affected, and is rather congested than inflamed. The pleura is rarely attacked; but the substance of the lungs is sometimes implicated; and it then commonly becomes rapidly infiltrated or condensed, a fatal result quickly supervening. This complication is often obscure, or even latent; but it generally admits of detection by auscultation, or by attentive observation alone. The patient sometimes complains of stricture, oppression, or dyspœcia, but very seldom of pain in the chest. The respiration is short and hurried, is attended by the mucous rattle, and with more or less cough. The skin is seldom hot; at a later period it is cool, or even cold, in the extremities, and dusky or lurid; the cheek is tinged with a dark red, and often assumes a livid or purplish hue. The pulse is rapid and weak. The confusion or stupor of an early stage passes quickly into low, incoherent, muttering, and coma. The tongue becomes very dry, black, crusted, and fissured; it cannot be protruded, and articulation is lost. This state may continue for several days, with unconscious evacuations, and all the nervous symptoms prominently marked; at last the patient sinks asphyxied, the changes necessary to life ceasing to take place in the blood sent to the lungs.

474. *B. Nervous or Typhoid Fever with prominent Affection of the digestive mucous Surface*—the *Adynamic Fever* of several French writers; the *Dolhinenterie* of M. BRETONNEAU.—Many of the observations made respecting this affection in synchoid fever (§452.), apply to its occurrence in typhoid fevers. It is very commonly observed in large cities, and in circumstances that occasion the use of water containing animal matter in a state of

decay; and it commences in a similar manner to the other varieties of typhoid fever. The symptoms that usually attend its progress are—a tumid, tense, hard, or tympanitic state of the abdomen, at an early stage of the fever, frequently without pain or even tenderness on pressure, but with involuntary stools, and unconsciousness of their passage at a later period. The tongue is dry, black, incrustated, and the crust sometimes fissured; but it occasionally is dark red, dry, and devoid of papillæ or fur. The stools are often ochrey, and more frequent than natural. Discharges of blood, in greater or less quantity, sometimes accompany them; but the hæmorrhage, and the changes in the mucous surface occasioning it, may occur without much, or even any, relaxation of the bowels.

475. *C. Typhoid Fever, with prominent Affection of the cerebro-spinal nervous System*—the *Ataxic* of PINEL—is seldom attended by acute pain in the head. But heaviness, stupor, confusion, and giddiness are felt severely, and very early in the attack. The eyes are injected, suffused, and devoid of lustre. Delirium appears early, and frequently becomes more violent than in mild typhus; the patient attempting to get up, or out of bed. The scalp is warm, or hot, and the extremities are often cool. Insensibility and coma quickly supervene, and are sometimes attended by spasmodic contractions of the muscles of a limb, or by partial convulsions. Inability to swallow, retention of urine, and loss of speech are occasionally observed. Startings of the tendons, relaxation of the sphincters, and failure of the circulation occur in the last stage, and usher in a fatal termination. This complication is especially characterised by the early appearance and the severe form of the symptoms depending directly upon the state of the cerebro-spinal nervous system.

476. *D. Typhoid or Nervous Fever with severe Affection of several vital Organs*—*Typhus gravior* of Cullen and others—is generally characterised by intense disorder of the brain and digestive canal, with more or less evident affection of the bronchial surface; delirium being early, and at first somewhat violent, and soon followed by insensibility, &c. The pulse is quick and weak; the skin is hot, dry, pungent, or harsh, in an early part of the stage of reaction, but it generally becomes cool, particularly in the extremities, and often discoloured; respiration is panting or quick; the tongue dry and black; the abdomen tumid, tender, or tympanitic; and the stools are dark, offensive, and passed involuntarily and without consciousness. In this form there is some degree of reaction, expressed most severely in the digestive canal and cerebro-spinal nervous system; but it is characterised by depression of vital power, that is soon increased by the exhaustion consequent upon the reaction induced in this state.

477. The vital organs may, however, be severely affected, although excitement be very slightly, or even not at all, manifested. Such cases constitute the *Congestive Typhus* of some modern writers,—a form of comparatively rare occurrence, unless accompanied with petechiæ and other symptoms indicating serious changes, not merely of vital action, but also of the fluids and soft solids.—In this variety, the depression of

vital power is extreme from the commencement, and such as prevents the development, and, in some cases, even the least manifestation, of excitement. The causes of the disease have given vitality a shock beyond its powers of resistance, or of recovery. Muscular power is almost entirely annihilated, and the anxiety at the epigastrium and præcordia is extreme. Respiration is oppressed, and the pulse is quick, sometimes irregular, intermittent, or even slow, and always small, weak, and thready. The countenance and eyes at first have an intoxicated appearance: the former being pallid, occasionally slightly bloated, or livid and dingy; the latter being vacant or suffused, and, afterwards, injected, ecchymosed, half shut, or open. The skin, at an early stage, is warm or harsh; subsequently it is cool, withered, lurid, and, sometimes, studded with petechiæ or vibices; the extremities being cool, or even cold, and dingy, or of a leaden hue. The mind is very much confused at the commencement, and soon passes into a state of incoherence, delirious muttering, and coma. The patient is unable to protrude the tongue, owing to deficient power of the muscles of the organ; and seldom complains of thirst. The abdomen is tumid or inflated; the bowels being relaxed, the stools black and offensive, and, with the urine, passed unconsciously. The progress of the disease is usually rapid, and generally to a fatal termination; but the *premonitory stage* may be protracted, although severe — the *invasion* being sometimes sudden, and resembling an apoplectic seizure. If the powers of life rally, recovery may take place; but it is tedious, and often attended by various consecutive disorders.

478. *E. Of other Modifications or peculiar States of Typhoid or Low Nervous Fever.* — Various phenomena beside those already described may accompany this fever, according to the combination and intensity of the causes, the previous health of the patient, and the circumstances affecting him subsequently to the operation of the exciting agent. — *a.* When caused by *mental distress, despondency, &c.*, this fever presents certain peculiarities deserving notice. The patient is dejected, indolent, and incapable of exertion. He loses his appetite and strength; he cannot rest at night, or his sleep is disturbed and unrefreshing; and he complains of headach, and of many of the symptoms of a common cold. He is absent, his mind being constantly occupied with the subject of his misery. His countenance assumes an anxious appearance; his healthy looks vanish; and his absence of mind often passes into a state of reverie. After several days, manifest affection of the brain is observed, with characters varying with the age, strength, condition, and habits of the patient. In the robust, plethoric, and in persons addicted to intoxicating liquors, it is sudden and violent in its accession; the headach and despondency quickly passing into delirium of an active and constant kind — the patient calling out, or starting up, and attempting to get out of bed. The pulse is quick, firm, and oppressed, or small; sometimes soft or irregular. Muscular power is not so much, nor so early, reduced as in the other states of the disease, but there is continual jactitation. In the debilitated, the aged, or the ill-fed, the cerebral affection is

less violent in its attack, and commences more gradually, often attended by red or suffused eyes, or by catarrhal symptoms, or by diarrhœa; by delirium, tremor, great prostration of strength, hurried breathing, weak quick pulse, subsultus tendinum, and, sometimes, with a mottled appearance of the surface. In other respects, the progress of the disease is nearly the same as the more severe cerebral complications already noticed (§ 475.), but it much more frequently terminates unfavourably.

479. *b.* In some cases the fever is complicated with *sore throat*; and this symptom is occasionally so severe and early as to resemble an attack of *cynanche maligna*. Indeed, cases not infrequently occur, which fully indicate that the one disease may pass into the other, under favourable circumstances in respect of predisposition and concurrence of the exciting causes; or, in other words, that in young persons, in those predisposed to sore throat, and in cold and humid states of the air, certain of the exciting causes of typhoid fevers will sometimes occasion a malignant or putrid inflammation of the throat, ushered in and attended by this form of fever; or they will, in such, or similar circumstances, produce a low fever, in which inflammation of the throat is a contingent complication, and assumes an asthenic or unfavourable character, owing to the depressed state of vital power, and morbid condition of the circulation, in which it occurs. This complication is observed either as the most prominent local affection, or in conjunction with some other remarkable disorder, especially with the gastric complication. In some instances, it is very severe; the pharynx and upper part of the œsophagus being also more or less affected, and deglutition altogether prevented.

480. *c. Paralysis* may occur, especially in the cerebral state of this fever; and, in this case, the use of one side of the body is generally lost. If the patient recover from the fever, the functions of the paralysed side are often gradually restored. This complication may take place in those cases which commence with protracted or severe premonitory symptoms, against which the patient struggles, until he falls down from exhaustion; or is *suddenly* seized, as in a case of apoplexy — the fever running its course, as after the usual invasion, with chills, rigors, vomitings, &c. When the disease is developed in this sudden manner, it commonly presents the cerebral character throughout, with delirium, passing into coma, &c. In a case, however, of this kind, the cerebral symptoms were subsequently slight, and the disease mild.* In some of the cerebral cases of this fever, the affection of the mind continues for some days, or even weeks,

* A young lady went some distance to visit an intimate friend, delirious in fever; and having gone into the chamber, she was sensible of a disagreeable odour upon the curtains of the bed being drawn. She soon afterwards complained of slight nausea, of headach, loss of appetite, and general lassitude. These symptoms continued gradually to increase for six days, during which time she kept about. On the morning of the seventh day she suddenly fell down without sense or motion. I saw her in this state soon afterwards, and, viewing the attack as the result of sudden congestion of the brain, and before I had learnt the above particulars, I prescribed a moderate bloodletting, and purgatives. The functions of the brain soon returned, and the fever ran its course in a mild form, and without delirium or prominent affection of any organ.

after the bodily functions are restored. Instances may even occur of permanent insanity being the consequence. But, in all such cases, hopes of recovery should be entertained until some weeks, or even months, have elapsed from the disappearance of the fever.

481. *d. Relapses* are not infrequent after the mild forms of typhoid fever; especially when the duration of the disease has been shortened by the treatment, or its course materially altered. They are also much more common in one epidemic than in another. In many instances, particularly when the procession of the morbid phenomena has been interrupted by large depletions, or drastic purgatives, the symptoms become ameliorated for a time, but recur with their previous severity; the recurrence being different from a relapse. — This fever, especially its gastric and enteric states, may pass, or be converted, into a low or typhoid form of *typhoid* (see that article, § 26, 27.), owing to the influence of the same circumstances that usually cause relapses; especially premature exposure in early convalescence; the use of too much, or of improper, food; the continued operation of the exciting causes; a close, impure, and infectious air; and suppression of the excretions. — *Local affections*, particularly *inflammations*, may also appear during convalescence, arising either from the above causes, or from atmospheric vicissitudes; or from whatever may inordinately affect the nervous and vascular systems. In these cases, the inflammation is apt to pursue a severe and rapid course, owing to the unfavourable or debilitated state of constitution in which it occurs. Bronchitis, often associated with affection of the substance of the lungs, and inflammation of the mucous surface of the bowels, sometimes with softening and enlargement, or ulceration, of the mucous follicles, are the most common diseases thus contingent on convalescence. Inflammatory affections of the stomach or liver may also take place. When the surface of the intestines is the seat of consecutive disorder, the bowels generally are more or less relaxed, and the stools are of an ochrey hue, and offensive. In such cases, the follicles are especially affected; are often ulcerated; and, although they will generally heal under judicious treatment, perforation of the intestines and fatal peritonitis may be the result at a period more or less remote from the disappearance of the fever.

482. *F. Of Petechiæ and exanthematous Eruptions in Typhoid Fevers.* — Nervous or typhoid fevers may occur sporadically or epidemically, without any *petechial* or other eruption; or may be attended by *petechiæ* or *vibices* in their progress, and particularly at an advanced period, or by an *exanthematous eruption* at an earlier stage; or even by both kinds of cutaneous affection, either successively or almost coëxaneously. For many years, or in successive epidemics, or even in a single epidemic, typhoid fever may appear in any one or more of the states just described; or it may assume either of these forms, associated with one or other, or with both, of the affections of the skin just mentioned in a portion of the cases only; or the affection of the skin may be one of the most unvarying and chief characteristics of an epidemic: and, of the cases composing such an epidemic, some may be of

the mild, others of the complicated or severe form; some may evince more or less reaction or excitement, others may present depression of the powers of life and congestion, as prominent phenomena throughout. The above description, although applicable more especially to the occurrence of typhoid fever, independently of any marked affection of the skin, yet does not the less apply to the occasional association of the disease with this affection. Those epidemics, in which the changes in the skin are very constant phenomena, sometimes possess other characters, both in the early and in the advanced stages, that require an especial notice. Whilst these changes — both *petechial* and *exanthematous* — have been considered by HILDENBRAND, NAUMANN, FODÉRE, PEEBLES, and other experienced writers, as indications of specific kinds of fever, which, in the early stages, may present more or less either of inflammatory excitement or of depression of vital power; they have been viewed, by many authors, merely as occasional occurrences, or as modifications met with only in certain epidemics, and not as characteristics of distinct varieties.

483. In trying to solve this question, the same difficulties present themselves that arise in all attempts to arrange the different varieties and states of fever in such an order as the more constant phenomena may warrant, and as may conduce to appropriate and successful methods of treatment. If I refer to my own observations, in different parts of the Continent, some time after the late war, and in various parts of this country, both before and subsequently, I shall find — 1st. That *petechiæ* and *vibices* were either seldom or rarely seen for several years, and in some epidemics, excepting in the most severe or malignant cases, or when favoured by a too stimulant treatment, and a too heating regimen, during the early stages; and that, at other times, they appeared more frequently in the advanced periods of the lowest forms of fever, and even, although much more rarely, towards the termination of synochoid fever, when antiphlogistic remedies had been neglected in the stage of excitement. — 2d. That this change, in some epidemics, was a very common or even general symptom, occurring in mild as well as in severe cases, although presenting very different appearances in each; and that they were sometimes observed early in the low states of fever, particularly when caused by unwholesome and deficient food, by a foul atmosphere, or by infectious miasms. — 3d. That they were very frequently connected, especially in the plethoric, in the previously unhealthy, and in persons using much animal food, with evident change of the circulating fluids, with predominant disorder of the digestive organs, with a soft, broad, and open pulse, and with hæmorrhages from the intestines, and a tendency to disorganisation of the mucous surface of the bowels. — 4th. That an *exanthematous rash* or eruption was observed in some epidemics, from the third to the eighth day of the fever, was quite distinct from *petechiæ*, generally appeared earlier, and was, in some cases, either associated with, or succeeded by, *petechiæ* or *vibices*, or even both. — 5th. That this exantheme was of a reddish colour, varying in deepness, and rarely passing to a dark hue; that it occurred in cases characterised by vascular reaction in the early stage, as well as in

those of a very low grade—in the mild, in the complicated, and in the severe; that this eruption was most probably overlooked in many cases where it existed; and that it was very generally confounded with petechiæ, owing to its late appearance, or to its colour changing, in a somewhat similar manner to petechiæ, with the states of vital power and of the circulating fluids.—6th. That although the difference between both these affections of the skin has been insisted on by HILDENBRAND and NAUMANN, it has been too widely drawn by them, and without due reference to the occasional association of both affections. From these facts, therefore, I am induced to come to the conclusions above stated (§ 482.); and, conformably with the views of the experienced writers just mentioned, to notice more particularly the states of fever in which these changes in the skin are observed, without considering these states as always constituting distinct species.

iii. TYPHOID FEVER, WITH PUTRO-ADYNAMIC

CHARACTERS. SYN.—*Putro-adynamic Fever*, Συνοχος μετὰ σπυρδός, Galen; *Synochus Putris*, S. cum Putredine, *Febris continua Putrida*, Rivière; *F. continens Putrida*, Sello; *F. Putrida sanguinea*, Vogel; *F. colliquativa putrefaciens*, Quesnoi; *F. Hungarica*, *F. nervosa-putrida*, *F. asthenica*, *F. contagiosa*; *F. colliquativa essentialis*, Borsieri; *F. Putrida simplex*, Richter; *F. caractere putrido aut septico*, Hildenbrand; *F. Petechialis*, *F. Nosocomialis*, *F. Castrensis*, *F. Purpurata maligna*, *F. Maligna*, *F. Carceraria*, *Pestis Bellica*; Auct. var.; *F. Continens maligna*, Huxham; *Das Faulfieber*, *Faulige Fieber*, Germ.; *Fièvre grave*, *F. Maligne*, *F. Putride*, F.; *F. Adynamique*, Pinel; *Febbre Putrida*, Ital.; *Morbo Petechiale*, Cerri; *Febbre Petechiale*, Rossi; *Febbre epidemica Petechiale*, Buffa; *Petechial Typhus*, Camp Ferer, *Jail Fever*, *Putrid Fever*, *Putrid Malignant Fever*, *Spotted Fever*.

484. Conformably with what I have stated above, I consider this as a variety merely of typhoid fever; its especial characteristic—the appearance of petechiæ and vibices—being contingent upon certain circumstances and causes tending to contaminate the circulating fluids, and to destroy the tonicity and irritability of contractile tissues, and appearing only as the effect of a series of anterior changes. Although petechiæ may occasionally appear in the advanced stages of other fevers, particularly those of the typhoid form, yet in those epidemics which result from famine, war, unwholesome food, and from air loaded with putrid animal and vegetable matter, or with the emanations proceeding from a number of persons shut up in a close atmosphere—causes which are often conjoined—this symptom is very generally, if not constantly, observed, and is only one of the indications of the very serious changes which have taken place, not only in the blood, but also in the soft and irritable structures of the frame. Infection, either directly or by fomites, is, however, the chief cause, although cold, humidity, fear of the disease, and the other agents just noticed, may either generate the fever *de novo*, or predispose the system to infection, or aid its operation after exposure to it. Although certain epidemics evince a putrid or septic character at an early period, and thereby justify the appel-

lation generally given to them; yet this character is seldom primary, or otherwise than the consequence of suppression or exhaustion of vital power, the fever commencing in some one of the forms already described. Indeed, there is no variety of fever that may not evince a septic or putrid state—1st, from the vital depression produced by the exciting cause; 2dly, from exhaustion consequent upon vascular reaction; 3dly, from the passage of contaminating matters into the blood; and, 4thly, from these states conjoined. Hence, when the causes are of a contaminating kind, and the influences continuing to operate after infection have a similar tendency, putrid or malignant symptoms will arise, whether the fever be synochoid, nervous, typhoid, or gastric, in its early periods. These fevers are the most prone to the septic character; but others, as remittent, inflammatory, and bilious fevers, may also assume it. This particular character may, or may not, be developed, or may appear at a later or earlier period, owing to the nature and diversity of the causes; to the condition of the internal functions and of the circulating fluids at the time of attack; to the rigidity or tone, or to the laxity, of the softer solids; to the violence or absence of vascular reaction; and to the early treatment and regimen.

485. A. Petechial, or putro-adynamic fever, generally commences with the premonitory and invading symptoms usually observed in other fevers of a low grade. When an epidemic presents changes of a septic or putrid nature, as predominant features, the early stages of the fever vary most remarkably according to the intensity of the causes, and the state of the patient. The period which elapses from infection till the manifestation of the disease ranges from a few hours to five or six weeks. It is commonly some days, but sufficient evidence has been furnished, in the Irish and other epidemics, that the longest of these periods may occur. During the time the disease thus takes to form, the usual premonitory symptoms are observed, and increase until chills, herpitations, or rigors are felt. In some instances the disease commences insidiously, with or without catarrhal symptoms, becoming gradually severe and dangerous. In these, it is often difficult to assign the exact period of attack. Fatal cases most frequently begin in this manner, especially in the plethoric, cachectic, and persons accustomed to full living. In others, after a protracted and severe premonitory stage and indistinct symptoms of invasion, the fever proceeds with indications of imperfectly developed reaction, and soon assumes a putrid or malignant form. In some cases, rigors and shiverings sufficiently evince the period of attack, and quickly give rise to inordinate reaction, followed by exhaustion and evidence of change in the fluids and soft structures. Amongst the most constant of the early symptoms are—dull pains in the head, occiput, back, and limbs; universal weariness, soreness, and loss of muscular power; confusion of mind; pains in the joints and limbs resembling rheumatism; frequent sighing; nausea or vomiting; and noises in the ears.

486. The pulse, when reaction is developed, is full, open, quick, sharp, but soft and easily compressed. Respiration is laborious, suspicious, with oppression or anxiety at the præcordia and epigas-

trium. Burning heat is often felt internally, and on the surface of the trunk. When reaction is either imperfect, or does not take place, the pulse is slow, or not more frequent than usual, is weak and compressible, sometimes unequal or intermittent; and the temperature is little or not at all increased, or it is unnatural. The tongue is either loaded and furred, or flabby and covered with a dirty mucus. Thirst is generally urgent. The vascular excitement usually continues, in various grades, from six to eight days; and as it passes its acme, or about this period, purplish spots, of the size of flea-bites, and of various shades of deepness, appear upon the neck, breast, and insides of the arms and thighs. The pulse becomes more soft and weak; sometimes unequal and small. The tongue is more loaded, and of a darker colour. Thirst is diminished, or is not complained of; and the excretions present a very morbid appearance, and an offensive odour. To these are added dulness of all the senses, or delirium, alternating with stupor, difficulty of articulation, and often also of deglutition, leipothymia, faintness, and tremors. From the eleventh to the seventeenth day, but frequently earlier, the abdomen becomes tympanic, if the disease proceeds *unfavourably*, the petechiæ are of a darker colour; vibices or blotches appear on the extremities; profuse fetid perspirations break out without relief; the posture is constantly supine; parts pressed upon quickly sphacelate; the temperature sinks often below the natural standard; and the tongue is now black, fissured, or flabby, clean, dark red, or livid. Coma; subsultus tendinum; convulsions; hæmorrhage from the bowels; or exudations of a sanious fluid in the evacuations, or from the gums, lips, and nostrils; also take place towards the close.

487. A *favourable* change most frequently occurs from the ninth to the seventeenth day, and is indicated by profound sleep; by a warm, soft, and moderate perspiration; by turbid urine; by natural stools; and by a brighter colour, or disappearance, of the petechiæ.—The duration of this fever is seldom longer than twenty-one days; but it may terminate on any intermediate day between the sixth and twenty-fourth. A fatal issue occurs most frequently from the eighth to the fourteenth.—Towards the close of an epidemic, the usual course is often departed from; mild cases of short duration, and *relapses*, amongst these especially, being very common. When mercury has been given so as to affect the mouth, a crisis is prevented, and convalescence is protracted.

488. *B. Modifications.*—*a.* Such is the more usual course of the disease, particularly as observed in modern times. But it presents various grades of severity, and several modifications and complications. It is in some cases, even in the same epidemic, comparatively mild; yet presenting manifest signs of colligation, or of a septic tendency, particularly as respects the state of vital power, the circulating fluids, and the appearance of the petechiæ. In others, the attack is violent from the commencement, and the symptoms intense; diminution of the vital cohesion of the tissues, and dissolution of the fluids, appearing early and proceeding rapidly. In many, the invasion is gradual, or much less tumultuous, than in these; the progress is more insidious, and the results are not less dangerous. In both, the body undergoes

decomposition soon after death, and the rigidity usually observed *post mortem* does not take place.

489. *b.* When this fever is epidemic, petechiæ may appear as early as the third, fourth, or fifth day from the attack, in mild as well as in severe cases; and a white miliary eruption may break out at a late stage, particularly when the perspirations are copious. Yellowness of the skin, or purplish colour of the extremities, or enlargement and inflammation of the glands in the neck or groins, may occur in an advanced period. Pimples may also appear on the surface, and may be considered a favourable indication. Although delirium and insensibility generally follow the headach of the early stages, yet the mind may be serene and unaffected throughout—even to the moment of dissolution. In cases which present no distinct sign of invasion, nor of reaction, but proceed insensibly to a general colligation of the fluids and solids, the excretions, both cutaneous and intestinal, are generally abundant and very offensive; the flow even of urine being sometimes excessive. The tongue is occasionally natural; or it is clean and raw-like; or as if streaked with blood, or with a bloody sanies. An aphthous state of it, and of the lips, is also sometimes remarked.

490. *c.* In persons who live fully and luxuriously, particularly if they have passed their thirtieth year, this fever often proceeds in an insidious but fatal manner. Such patients do not complain of pain, or of much uneasiness; although they are remarkably debilitated and depressed. Their manner is somewhat hurried, but their intellect is clear. The skin is greasy, and covered with dun petechiæ, sometimes intermingled with white miliary vesicles; its temperature is low; the countenance slightly suffused; the eyes glassy; the tongue sometimes loaded or crusted, or clean and moist; thirst is often absent, and the pulse but little accelerated. Convulsions are frequent; and a fatal termination often ensues, mostly before the fourteenth day.

491. *C. Complications*, similar to those already described, may take place in the early stages of this disease.—*a.* The *catarrhal, bronchial*, and *pulmonary complications* are most common in winter. When the bronchi and lungs are seriously implicated, the respiration is short, hurried, or laboured; cough is frequent; and the sputum is bloody, rusty, or consists of a dark, sanious matter, particularly in the latter stages.—*b.* The association with *cerebral affection* is very frequent, particularly in the strong and plethoric, and in persons whose minds have been much harassed previously to the attack. These latter seldom recover from it. In this state the headach is severe from the commencement; the eyes are injected or suffused; reaction is more or less *critical*, and is often attended by epistaxis, which, however, is never critical. Delirium, insensibility, subsultus tendinum, &c., are common phenomena in the latter stages of unfavourable cases.—*c.* The *digestive canal and liver* are chiefly affected in summer and autumn; the fever assuming gastric and bilious characters at its commencement, with bilious vomitings, &c., but soon passing into the putrid state. The enteric and dysenteric states are also frequent, especially at later periods of the disease. The *enteric* is the most dangerous of the abdominal complications,

particularly when the petechiæ, or vibices, are of a dark, or deep purple colour; the abdomen tympanitic; and the stools are green, livid, or black, mixed with dark fluid or grumous blood. In these, fatal hæmorrhages sometimes occur. The dysenteric state may take place in mild as well as in severe cases, at an advanced stage; with severe gripings, and dark sanious, bloody, and mucous stools, which are very foetid and infectious. The disease may thus pass into the adynamic form of dysentery. This change was common in the epidemics lately prevalent in Ireland. — *d.* The complication with inflammation of the *fauces* and *pharynx*, or with putrid sore throat, is sometimes observed, and is to be distinguished from primary *cyananche maligna*, by its occurrence in the course of the fever, or as a contingent affection (§ 479.).

492. The *sequelæ* of this fever are sometimes serious. They consist chiefly of dysentery, chronic diarrhœa, dropsies and oedematous swellings of the extremities, pulmonary consumption, hepatic obstructions, mania and other forms of insanity, abscesses in various parts of the body, sloughing sores, inflammation of veins, particularly of those of the extremities, gangrene of the feet, rheumatic affections, &c. Most of these result in great measure from the changes that have taken place in the blood during the fever; these changes affecting the blood-vessels, and organs most susceptible of congestion. — *Relapses* are frequent in cases of short duration, and in those which have been apparently cut short by active treatment; and are generally more dangerous than the first attack. They are more common in males than in females; and towards the close of an epidemic, than at its commencement.

493. *D. Diagnosis, or the Changes which more especially constitute Malignancy or Putro-Adynamia in Fevers.* — *a.* The *secretions*, next after the state of vital power, indicate incipient dissolution of the vital cohesion of the blood and soft tissues. — The *urine* has first a more viscid and albuminous appearance than usual. It is frothy, browner, and less transparent. If this pathological condition increases, the urine becomes brown, or dark brown, clouded, turbid, muddy, and often deposits a brown sediment. It quickly becomes putrid or offensive. — The *fæces* are foetid, or have a putrid smell — are dark, fluid, ochrey, or contain blood. — The *sweat* is thick, clammy, sometimes cold, copious, and always offensive; and occasionally it imparts an ichorous stain to the linen. — The secretion poured into the mouth is a thick, viscid, slimy, dirty mucus, of a dark brown colour, that collects over the teeth, edges of the tongue, and lips.

494. *b.* The changes observed in the *vascular system* are — an open, broad, soft, compressible, undulating, or unequal, or a very quick, small, thready, and irregular pulse: a more than usually dark appearance of the superficial veins, or dark streaks in their course; and, at an advanced stage, exudations of dark, dissolved, or thin blood, or of a bloody sanies, from the outlets of canals, as the mouth, nostrils, anus, vagina, &c. — Blood taken from a vein, even previously to the occurrence of these signs, is very dark, thin, sometimes of a black purple hue; and either does not separate into coagulum and serum, or coagulates into a soft, pulsatious, or gelatinous

mass, with imperfect separation of the serum. The fibrinous and albuminous constituents are deficient; and, owing to this circumstance, together with the want of vital power in the vascular system, the coagulum wants cohesion, the least agitation causing a partial admixture of red particles in the surrounding serum. — As the dissolution of the vital cohesion of the circulating fluids and softer solids proceeds, the colouring particles of the blood often fall to the bottom of the vessel, or of the gelatinous coagulum, leaving the upper stratum, and the surrounding serum, of various shades — sometimes of a greenish, purplish, or reddish hue. LANGRISH, HUXHAM, FONDYCE, MILDENBRAND, and others, have noticed a peculiar putrid odour of the blood when taken from a vein. (See BLOOD, § 110. *et seq.*). This fluid soon undergoes putrefaction after its removal from the body. It presents, however, various anomalies, in particular cases, or in some epidemics; but it seldom evinces very remarkable alterations, excepting as the grosser and more palpable results of anterior changes, which, although evidently of a most important kind, admit not of precise recognition; nor do those alterations occur until the symptoms indicate depression of constitutional power, imperfect assimilation of absorbed fluids, and lesion of the depurating functions. In connection with these changes, particularly those of the blood, the tonicity, or vital cohesion, of the extreme capillaries and softer solids are very much impaired, occasioning thereby further alterations. The functions of the cerebro-spinal nervous system are often more or less disordered, as in low nervous fevers; and the states of the mucous and cellular tissues, and of the skin, are remarkably altered. The cellular tissue becomes flaccid, softened, or less coherent, and consequently slightly tumid; and hence the bloated appearance in extreme cases; or cachectic fulness of the surface, in the most fatal states of the disease. The mucous tissue is discoloured; it exhibits a dirty brown, or grey, or livid hue, with black ecchymosed spots.

495. *c.* The *cutaneous surface* is at first merely dusky or lurid. But as vital power is further depressed, a bluish, marbled discolouration is sometimes observed in the shape of veins. *Petechiæ* of various depths of shade, from a lively or dark red, to a purplish or brown colour, appear principally upon parts usually covered by the clothes. They are either alone, or attended by the exanthematous eruption characterising the variety next to be noticed (§ 497.), or by dark or purplish spots of various sizes. In some cases, the skin, especially that of the extremities, becomes of a dark purple colour. When there is much heat of surface in the early stage of excitement, a caustic or morbid sensation is imparted, which increases whilst the hand remains in contact with it. When copious sweats follow, a white miliary eruption, intermingled with petechiæ, or vibices also, sometimes is observed. As the temperature is reduced, an unpleasant raw, cadaverous, or cold feeling is imparted to the hand of the examiner; and the petechiæ often become much darker, or more numerous, or aggregated, or almost confluent in some parts. In such cases, *passive hæmorrhages*, particularly from the bowels, are not uncommon; but they may also occur without much change in the skin. The

integuments readily sphacelate from slight injury, irritation, or pressure; and may even be the seat of sphacelating sores or carbuncles in extreme cases.—Enlargement or obstruction of the lymphatic glands, with a tendency to asthenic inflammation and disorganisation of the surrounding cellular tissue, is sometimes seen in the most malignant cases; but these changes take place most remarkably in *plague*, which has been considered by many able writers as a modification merely of this fever—the one disease running into the other. (See the article on that disease.)

496. As to the *causes* of, or pathological states giving rise to, the septic or putrid changes in the fluids and solids, observed more remarkably in some fevers than in others, even the most experienced writers are not agreed. There can be no doubt that these changes should be referred chiefly to the depressed state of organic nervous or vital power, and to the consequently imperfect functions of assimilation, excretion, and depuration, as insisted upon above (§ 102.), and in the article *Blood*. But the direct introduction of putrid animal or vegetable matter into the circulation, in considerable quantity, so as to depress the vital influence below the power either of salutary reaction or of excreting it through the emunctories, will so contaminate the whole mass of fluids, as to give rise to alterations and appearances very similar to those just described, and to many of the more intense symptoms previously noticed as depending chiefly upon the state of the cerebro-spinal system (§ 491.). The experiments made by GASPARD, MAGENDIE, and others (see *Lond. Med. Repository*, vol. xvii.), have proved this fact; but changes quite as malignant, as in the fever now being considered, and in *plague* and *yellow fever*, take place without any very manifest or demonstrable source whence they could have proceeded. In such cases, numerous facts and circumstances concur in showing that a morbid seminum—an infectious miasm—proceeds from the bodies of those already affected, and, through the medium of the inspired air, contaminates the blood as it circulates in the lungs, and affects the organic nervous influence. It may also be admitted, that miasms proceeding from animal and vegetable matter in a state of decay—from a number of persons breathing the same atmosphere—from those shut up in close, warm, and ill-ventilated places—will produce a similar effect, and generate a malignant fever *de novo*, which will be capable of propagating itself by means of the emanations evolved in its course.

iv. TYPHUS. SYN.—*True Typhus*; *Nervous Fever with exanthematous Eruption*; *Contagious Typhus*; *Febris nervosa epidemica*; *F. nervosa exanthematica*; *F. maligna cum sopore*, Rivière; *F. Contagiosa*; *F. nervosa petechialis*; *F. pestilentialis Europa*; *Typhus Contagiosus exanthematicus*, Hildenbrand; *T. Castrensis*, Boerhaave; *T. Gravior*, Cullen; *T. nostras*, *T. Europæus*; *T. Communis*, *T. Bellicus*; *T. Contagiosus*, Naumann; *T. Exanthematicus*; *Pestis Bellica*; *Der Ansteckende Typhus*, *Das Ansteckendefieber*, *Das Exanthematische Nervenfieber*, Germ.; *Die Kriegspest*, Hufeland; *Das Fiechfieber*, Reuss; *Typhus Contagiosus*, *Fievre d'Hôpital*, Fr.; *Fievre adynamique ataxique*, Pinel; *Tifo Contagioso*, Ital.

497. This fever is characterised by phenomena

which distinguish it from the foregoing varieties;—by *catarrhal and gastric symptoms early in the disease*; by *stupor, delirium, or typhomania*; by a *peculiar cutaneous eruption*; by *more or less evident affection of the liver*; and by the *determinate course and regular succession of all the febrile changes*.

498. *True or contagious typhus* has been confounded with *synchooid* and *nervous fevers*, on the one hand, and with *putrid or malignant fever*, on the other. It has been already stated, that putridity or malignancy not only may characterise a particular form of fever or certain epidemics, even at an early period of their course; but also, owing to various contingencies, may take place in advanced stages of any other fever. As the circumstances favouring the generation and spread of typhus are often such as also tend to develop those changes which have been usually named putrid or malignant, and as these changes are frequently observed in the latter stages of typhus—the symptoms distinguishing this fever becoming associated with, or followed by, those indicating the putro-adynamic state—so has it been often confounded with other fevers, in which this state has predominated more or less. If we refer to the numerous histories of epidemic typhus recorded by writers from the close of the fifteenth century up to the present time, or even to the brief abstracts furnished by M. OZANAM (*Hist. Méd. des Maladies Epidémiques*, &c. t. iv. p. 155. et seq.), we shall find, that although many of these, owing to the concurrence of circumstances developing a putrid or malignant disease, were instances of fever, either identical with, or very closely resembling, that which I have described as such in the preceding section; yet many others—or even the majority—were true typhus in which the putro-adynamic state was either early or prominently developed; the exanthematous eruption characteristic of typhus being succeeded or accompanied by the petechiæ indicating the approach of the septic condition, and being either mistaken for them, or for an eruption of miliaria. Owing to this circumstance especially, typhus, low nervous, and putrid fevers have been very generally confounded together. The essential characters of typhus were first distinctly traced by SAUVAGES; but CULLEN mixed them up with the symptoms of those forms of low nervous or typhoid fever which occur sporadically. Even among modern writers, comparatively few have made the distinction, excepting HILDENBRAND, FODÉRÉ, NAUMANN, PEEBLES, and some others. True or contagious typhus has not been epidemic in England for many years; or, if it have appeared in a few places, it has not extended beyond them. In Ireland, however, it was extensively prevalent, particularly in the years 1817, 1818, and 1819; and in some parts of Scotland since that time. The fevers most commonly observed in England, and particularly in London, have been either synchooid, simple, or complicated; or low nervous fever variously associated, and but rarely displaying a predominance of putrid or septic characters.

499. True typhus, although prone to assume a septic condition, especially when epidemic, and appearing under the unfavourable circumstances about to be noticed, yet may run its whole course

without petechiæ or any marked putrid symptom. It may, as shown by HILDENBRAND, be simple, or variously complicated; and, as remarked by Dr. PRESTES, it may be benign throughout, or assume a malignant character, according to individual diathesis, the nature of the prevailing epidemic, or the mode of treatment. It generally presents itself as an epidemic, is contagious, and runs a uniform course, unless predominant affection of some internal organ modifies its course or prolongs its duration.

500. It has been shown above, that the *petechial affection* consists of minute stains or ecchymoses, caused by the transudation of blood from the minute capillaries of the vascular *rete* of the skin, owing to the atony of these vessels, and the alteration of the blood; that it may occur in the advanced stage of any fever, even of the more inflammatory or purely eruptive, when converted into an adynamic or typhoid state, by improper treatment or the peculiar condition of the patient; and that it is not, in any sense of the word, an *eruption*, as it has been very improperly denominated by some writers. This change in the skin, which has been viewed as one of the chief indications of incipient putridity, or of a septic tendency, is very different from the eruption characterising typhus. The *petechiæ*, or cutaneous ecchymoses, vary in dimensions from minute *stigmata* to large patches or *vibices*, and in the deepness or shade of colour. They very rarely appear at the commencement, even of the more putrid or malignant fevers, unless from peculiar depravity of constitution, or from causes affecting more especially the circulating fluids— as imperfect nourishment, unwholesome food, or other injurious ingesta.

501. But the *exanthematous eruption* attending true typhus, is as characteristic of it as the eruptions of measles or of scarlatina; and, although observed by numerous writers, it has been confounded with petechiæ, with which it is often associated in the advanced stages of the fever, or with military eruptions.—HILDENBRAND gave a description of it, as it appeared in the contagious fevers prevalent in Germany during the commencement of the present century; and Dr. PRESTES has recently described it accurately and minutely, and as he saw it in Italy soon after the war. His description agrees with my own observations about the same period. This eruption appears in the early progress of a fever produced by human effluvia, when circumstances occur to promote them, or to prevent their dissipation. The animal miasm, whether generated by numbers crowded in a small space and confined air, or proceeding from a person affected by the disease, should be viewed as a poison, affecting the human body in a specific manner, and causing fever with an eruption of a certain form, which propagates itself by the diffusion of a morbid effluvia in the surrounding air, or by its retention in various animal productions or porous substances when shut up from the air.

502. This eruption usually appears from the third to the seventh day of the fever, but it may be delayed till the twelfth or fourteenth day. It is of a florid, reddish, or reddish pink colour; disappearing on pressure, but soon returning when pressure is removed. This circumstance is sufficient to distinguish it from petechiæ. The more exuberant

resembles the measles, and has been mistaken for them; but it is more papillar, and rougher to the touch, being sensibly elevated to the eye; and, although sometimes grouped or crowded, it does not coalesce so much as measles, but each papilla is more or less separate. It is sometimes vesicular, and followed by desquamation of the cuticle. It is occasionally indistinct, and may be then overlooked, and it sometimes approaches more nearly the military eruption. Hence it has been mistaken for this eruption in such cases. It is generally confined to the trunk of the body, the arms, and thighs; but it may cover nearly all the body. It rarely extends over the face or hands. In children, it appears only upon the trunk, or parts of it, and often scantily. It is sometimes evanescent, disappearing in one part of the day and returning in another (*PEBBLES*). It may be copious in some cases, and scanty in others, even in the same family. Owing to these circumstances, it may escape observation. It is not liable to recede early in its course; but if it disappear from injudicious treatment, or a faulty state of the system, malignant symptoms are apt to supervene.

503. In some cases, the interstices of the skin between the papillæ are red or erythematous. In these, there are also increased suffusion of the eyes, redness of the tongue at the point and edges, redness of the fauces, as in mild scarlatina, and subsequent desquamation of the cuticle. The *duration* of this eruption is from three to five days. When the exantheme is slight, it disappears without leaving discernible marks; but when it is exuberant, stains are left in the situation of the papillæ. If petechiæ occur in this fever, they seldom are observed before the eighth or tenth day, and then this eruption has usually disappeared. When the petechiæ are earlier, or the eruption continues longer, so that both exist together, they are quite distinct and different in their appearances; for the latter is never so dark or livid as the former generally is, and the petechiæ are not attended by the elevation of the cuticle and roughness characterising the eruption. The stains left by an exuberant eruption generally become livid when petechiæ are present; but the eruption itself does not assume a dark tint, as long as it retains its papillar form. In the more malignant cases, and when petechiæ appear early in the disease, the colour of the eruption may, however, become deeper, or may change with the alteration in the fluids and softer solids.

504. *A. DESCRIPTION.*—True typhus proceeds in a more regular and determinate manner than synchoid or nervous fevers; and presents the several stages into which I divided fever, when treating of it generally. The *premonitory stage* exhibits the same symptoms as are observed to announce other fevers, and varies much in duration. HILDENBRAND states from three to seven days; but a much longer time may elapse from the time of infection to the occurrence of the *stage of invasion*. This period is the commencement of the febrile paroxysms. It begins with a creeping sensation over the head and back, followed by shiverings, paleness of the surface, the cutis anserina, intervening flushes of heat, heaviness or giddiness of the head, and the usual symptoms of this stage. After a few hours—seldom more than twelve—the *stage of reaction*—the *inflammatory* of HILDEN-

BRAND, the *irritative inflammatory* of **GOEDEN**—appears. The pulse becomes full, strong, or oppressed; the countenance flushed; the skin hot and turgid; the head confused, heavy, or giddy; and the urine scanty and high-coloured. With these are associated catarrhal or gastric symptoms. —On the second day of this stage, after a sleepless and restless night, the heat increases, while the vomiting and sometimes the nausea disappear. The weight in the head changes to stupor, often with *tinnitus aurium*; giddiness is augmented, and the upright posture cannot be borne. The catarrhal affection is more developed: the eyes are red; the mucous membrane of the nose and fauces is tumid and red; deglutition is painful; tightness is felt in the chest, often with cough; and both hypochondria are tense and painful. The patient is averse from exertion, tardy in his answers, silent as to his complaint, and slow in protruding his tongue. These symptoms continue during the third and fourth days. On the latter of these, an exacerbation takes place, usually followed by a moderate epistaxis, excepting in the milder cases, and generally with relief of the affection of the head. From the third to the sixth day, but sometimes later, the surface of the body becomes turgid and the eruption appears. During the fifth, sixth, and seventh days, the symptoms are unchanged, excepting that the catarrhal affection commonly ceases with the appearance of the eruption. On the seventh day, an evident exacerbation takes place, followed by a slight remission of a few hours, and introduces a new stage.

505. The nervous stage—the *status nervosus* of **MILLENBRAND**—begins with the eighth day from the occurrence of rigors. The heat of the surface is now considerably increased, but the turgidity disappears. The epidermis is dry, shrivelled, and brittle; but petechiæ or miliaria are frequently present, and either appear in the latter part of the preceding stage, or early in this. The tongue, which was at first clean, and subsequently white, rather than loaded or furred, now becomes parched and shrunk. Thirst is increased; but the torpor is often so great that the patient does not ask for drink. The tightness of the chest goes off, and the breathing is freer, but more frequent. The cough ceases, and is often replaced by singultus. Swallowing is impeded, chiefly owing to the dryness of the fauces and pharynx. The bowels now assume activity—predominant action being determined to them in place of the skin. Repeated, loose, foetid stools occur, attended by slight pains in the bowels, and by flatulent distension of the abdomen, evidently owing to increased vascular action. The pulse is variable; it generally continues full, free, not very frequent, nor small or soft; and it often indicates imperfect reaction or contraction after the heart's impulse, or seems to be in a state of constant expansion. The most prominent, however, of the symptoms in this stage are those referrible to the sensorium. In the preceding stage, the external senses are impaired, and the ideas confused. There are sleeplessness, restlessness, and some involuntary motions. These are all aggravated or modified in this period. Muscular power is suppressed by the general torpor of the nervous system, rather than by debility, as in a state of intoxication; but the involuntary mo-

tions, such as tremors, subsultus tendinum, slight convulsions, or spasmodic affections, are increased. Difficulty of deglutition, and of evacuating the urine, is more common; deafness is increased; vision is impaired; and smell and taste are lost. The patient dreams without being asleep (*typhomania*), talks deliriously, is occupied with his internal impressions, and disregards or is unimpressed by external objects, or confounds internal and external perceptions. A single idea or impression usually torments the patient during the fever, and on recovery there is seldom any recollection of it. This state closely resembles somnambulism. With insensibility to external objects, there is complete loss of the appetites and desires; the patient wishes and feels nothing; and replies, when roused, that he is very well. This stupor, in various degrees, with the supine posture, at once announces the form of the disease. The foregoing symptoms continue during the ninth and tenth days. On the evening of the latter day, a stronger evening exacerbation than usual occurs, and lasts for a few hours; and a gentle perspiration, or some evacuation by stool or urine, takes place. A slight remission follows on the eleventh day; but on the twelfth and thirteenth, febrile heat, and the affection of the nervous system, are again increased.

506. The period of crisis now generally succeeds, and without any assistance from art. At the end of the thirteenth day, a more severe exacerbation than any former one takes place; the heat is more glowing; the arteries pulsate more strongly; the brain is more affected; and the stupor passes into sopor. In twelve hours afterwards, and on the fourteenth day, the parched skin shows a tendency to perspiration. In some, a slight epistaxis occurs, with relief to the head; the nostrils become moist; the tongue at the point and edges moist, clean, and red; and perspiration more copious and general. A free expectoration often takes place, especially if the chest has been affected. When the perspiration is salutary, it is uniform, not clammy, has a peculiar smell, and occurs during sleep. The stools are now copious, loose, and offensive; and the urine plentiful, muddy, high-coloured, and deposits a copious sediment. With these changes, or in a few hours afterwards, the patient seems as if he had awakened from a dream, or from a state of intoxication; and, with a return of complete consciousness, all the severe symptoms abate. A sense of fatigue and weakness, soreness of the whole body, pale hollow countenance, giddiness, deafness, and *tinnitus aurium*, drowsiness, or frequent inclination to sleep, tendency to perspire, quick pulse, and acceleration of it upon slight irritation or exertion, unnatural taste in the mouth, whitish tongue, &c., remain for six or seven days after the crisis—these symptoms gradually disappearing, the *tinnitus aurium* last of all.

507. B. Modifications and complications.—As in exanthematic fevers, so in this, variations from the regular type, both in the symptoms and in their course, are apt to occur, owing—1st, to the age, habit of body, previous health, and temperament of the patient; 2dly, to the prevailing epidemic constitution, whether inflammatory, bilious, or tending to the periodic type; and, 3dly, to the living, diet, and treatment, and to the unfavourable circumstances to which the patient is ex-

posed.—*a.* The *anomalous phenomena* observed in the *stage of invasion*, are few. The shivering may be so slight as hardly to be observed, the fever seeming to begin at once with increased heat; or the rigors may last or return at intervals during some days.—In the *period of reaction*, the modifications are often more numerous and striking. The inflammatory character of this stage is often greatly increased; sometimes as respects the violence of the general symptoms, but at others with severe local affection. When the *head* is the seat of prominent action, the delirium may be phrenitic, maniacal, or the stupor may amount to apoplectic sopor. Inflammation may take place, either in the *lungs*, or in the *liver*, or in the *digestive mucous surface*, and be so fully developed as to resemble idiopathic disease of these viscera, if the previous fever, stupor, tinnitus aurium, and peculiar eruption, did not establish the difference between them.—*Bilio-gastric* affection, also, may be so prominent as to simulate that form of fever. But the stupor and typhomania will assist the diagnosis, should the eruption be so slight as to escape observation. The *nervous* character may show itself prematurely; especially when the vital powers are weak, depressed, or speedily exhausted. In these, *septic* or *malignant* symptoms may occur. In some cases, the inflammatory stage may continue to the ninth or even to the eleventh day.

508. *b.* In the *nervous stage*, various modifications are also observed. Local affections may continue through the greater part of this stage, or may even first appear in it; particularly those seated in the intestines, and implicating especially the mucous follicles. Diarrhœa, or typhoid dysentery, may thus supervene, and be either slight, severe, or fatal. The former of these affections is caused by vascular determination to the intestinal mucous surface, consequent upon the subsidence of the eruption, and by the unhealthy bile secreted by the irritated liver from the impure blood circulating in it. The dysenteric symptoms are owing to the morbid action going on in the lower part of the ileum, in the cæcum, and large bowels. Lumbrici are sometimes passed. But the principal and most frequent variations consist in the appearance of numerous *petechiæ* and *vibices*, or in their increase or deeper hue, if they had previously been observed, 'th several other putro-adyamic changes. In these, the nervous symptoms may not be more remarkable than in milder cases; or these symptoms may be very prominent, either with or without the occurrence or aggravation of the malignant or septic state. Miliary eruptions may also appear in this stage. In the more unfavourable cases, the tongue may be shrunk like a piece of burnt leather, the heat of surface excessive, the diarrhœa exhausting, the distension of the abdomen great, and pains in the bowels severe. Muscæ volitantes, picking of the bed-clothes, constant muttering, spasmodic affections, stiffness or cramps of the extremities, paralysis of the eyelids or tongue, horror at liquids, may also occur. A black coating of the tongue and teeth; fætor of the breath, stools, and of the body; dark petchiæ or vibices; ecchy-moses or bluish patches; passive hæmorrhages, and even carbuncles, may appear during this stage, particularly when circumstances concur to produce putrid or septic changes in the course

of the fever. These severe cases, if they are not fatal before the fourteenth day, often run on to the seventeenth, twenty-first, or twenty-eighth day, and generally end in death.

509. *c.* Sometimes the *precrisis* on the seventh day either does not take place, or is not followed by any alleviation, or is attended by aggravation of the symptoms. If a decisive *crisis* take not place on the fourteenth day, it rarely happens till the twenty-first; a crisis between these days being seldom effective. When death occurs, the fatal change is either premature or procrastinated. The symptoms accompanying a crisis are often variable. Changes in the urine cannot be depended upon. Discharges from the bowels are often copious, without benefit; and if they continue so without alleviation of the symptoms, or are unnatural, ulceration of the intestinal mucous surface may be dreaded. A critical sweat is sometimes wanting, the patient recovering nevertheless.

510. *d.* The *decline* of the disease may be protracted, but never shortened; and attended by various symptoms, as a continuation of the stupor, nightly recurrence of delirium, or lingering affections of some one of the thoracic or abdominal viscera. A new disease, of an inflammatory kind, may occur during the stages of decline and convalescence, or tubercular consumption may supervene; and *relapses* are not infrequent in the latter period, owing to a fresh infection.—*Recovery* may be *retarded* by the severity of the complications, by want of sleep, by errors in regimen, and by the depressing passions.

511. *e.* The foregoing modifications refer entirely to aggravating circumstances; but some cases are so slight, that the patient scarcely leaves his bed—a trifling degree of stupor, with scanty eruption, and occasional pains in the bowels, constituting the chief complaint. In the more benign cases, a decisive crisis occasionally takes place as early as the eleventh, or even the ninth, day; but *relapses* are liable to follow, if the patient be exposed to a re-infection.

512. *v.* PROGNOSIS OF TYPHOID FEVERS. The prognosis will be influenced by the appearance of any of those phenomena to which attention has been directed above (§ 434.). But in addition to these, the practitioner will take into the account the previous condition, the *age*, and the *sex* of the patient; the nature of the prevailing epidemic; and the influences continuing to operate during treatment. As to the manner in which *age* should affect the prognosis, from the beginning, some very interesting facts have been adduced by Dr. ALISON, who has given the following table in illustration of the comparative prevalence and mortality of typhus at different ages, as observed in his practice:—

| | Cases. | Deaths. | Proportions. |
|----------------|---------|---------|--------------|
| Under 15 years | - 85 - | - 2 - | - 1 in 41½ |
| 15 to 30 - | - 149 - | - 11 - | - 1 in 13½ |
| 30 to 50 - | - 93 - | - 17 - | - 1 in 5½ |
| Above 50 - | - 17 - | - 7 - | - 1 in 2½ |
| Total | 342 | 37 | 1 in 9½ |

Of these 342, there were 170 cases of simple or mild typhus, in which only three deaths occurred; 79 cases presenting prominent affection of the head, and in these 21 were fatal; 58 cases with affection of the pulmonary organs, in which 13 were fatal; and 35 with abdominal affection, in

which only 1 death occurred. — From these, as well as from other data and facts, which have come before every experienced physician, it may be inferred that the mortality from this fever increases in an accelerating ratio with the advance in age and predominant affection of internal vital organs. It is very probable that the great increase in deaths at an advanced age proceeds from the circumstance of the powers of life being then less able to resist the changes and tendency to death that take place in the course of the disease, and the contamination of the fluids and soft solids; and from certain internal organs having then become highly predisposed to serious functional and organic lesions.

513. Typhus is seldom dangerous to children, in any class of society, although they are often attacked when the disease is epidemic. In the upper ranks, and in those accustomed to live fully and luxuriously, it is very fatal, and generally assumes highly inflammatory states in the early stages, or septic changes at a later period. In the epidemic in Ireland, during 1817, 1818, and 1819, from one fourth to one half of those in good circumstances, who were infected, died. Of twelve physicians who were actively engaged in the treatment of this fever in Cork, eleven were seized with it, and four died. It is less fatal to females than to males; but pregnant women frequently miscarry when they are attacked. Very few *negroes* recover from it. Persons whose minds have been much harassed previously to infection, are in the greatest danger. The putro-adynamic form, and, next to it, the low nervous, are most dangerous, of typhoid fevers.

514. vi. CAUSES. — The chief cause of true typhus has been already stated to be an animal miasm, generated either by a number of persons confined in a close air, or by the disease itself. This miasm contaminates the air, and infects the healthy frame through the respiratory organs — either directly as it proceeds from the morbid source, or indirectly by means of substances capable of retaining it for a time, and of giving it out upon exposure to the air. The causes *predisposing* to, or counteracting, infection, are deserving of a brief notice. Infants and old persons are the least susceptible. Adults, of delicate habits and melancholy disposition, and those who dread infection, are most liable to be attacked. Insufficient or unwholesome nourishment, personal or domestic filth, and bodily fatigue or mental distress, are very influential concurring causes. Persons of a lively disposition, those who use tobacco, and who have no fear of the disease, most frequently escape. Chronic diseases, particularly those of the lungs, ulcers, and external sores or eruptions, are very often preventives. HILDBRAND states, that, in his very extensive experience, he never saw a consumptive patient contract the disease. A regular and fully developed attack seems to prevent a second, for many years afterward, if not for ever.

515. Although animal or infectious miasms will occasion the low nervous and putro-adynamic fevers, yet they arise also from other causes, as shown above (§ 468. 485.). The latter not only may be consequent upon other forms of fever; but it also may proceed directly from terrestrial exhalations, or from animo-vegetable matter, decaying in a warm close air, or from a combination

of causes both internal or intrinsic, and external as respects the patient.

516. vii. TERMINATIONS and ORGANIC LESIONS. — True typhus terminates in recovery, in the great majority of cases — in about nine out of ten — even when left to nature. Medical treatment, if not very judiciously directed, may be as injurious as beneficial, by interrupting the regular succession of morbid phenomena, and preventing those changes from taking place that are conducive to recovery. An officious interference may thus be mischievous, particularly when the disease is regular or moderate, and no vital organ is very severely affected. Medical treatment will not shorten the disease; we can only expect to conduct it to a successful issue, by protecting internal organs from injury, when they experience the onus of morbid action, and by resisting the tendency to death, in the last stages. — A. When typhus ends in *death*, disorganisation of some important viscus, the exhaustion of vital power or of irritability, and deterioration of the fluids, are the immediate causes — each in various grades; for this event cannot be ascribed to one solely, although either may be chiefly concerned in producing it. — When debility or exhausted irritability, the state of the blood, or lesions of the intestines, cause this termination, the stupor and delirium generally cease, and the patient recovers his consciousness just before death. — Upon *dissection*, in these cases, no morbid appearances, beyond slight congestion, or a somewhat increased quantity of fluid in the ventricles or at the base of the brain, are observed within the cranium; the digestive mucous surface, and the blood in the large vessels and cavities of the heart, being most altered. When death is produced by inflammation of the brain, or of its membranes, during the stage of reaction, or by simple or inflammatory congestion, in this or the subsequent stage, symptoms of an irritated or inflammatory state of the brain, passing more or less rapidly into apoplectic sopor, precede the fatal issue. In these, the blood-vessels of the brain and membranes are engorged, sometimes with extravasation of serum, or of sanguineous serum, or more rarely of blood. The patient sometimes dies soon after a critical exacerbation, from the sudden occurrence of the apoplectic state. In this case, the brain is only slightly congested, with little or no effusion of fluid. In those who die with cerebral affection in an advanced period of the disease, collections of serous fluid in the ventricles, and between the membranes of the brain, are frequently found. Abscesses in the substance of the brain are met with in rare instances. HILDBRAND considers *nervous apoplexy* to be the most frequent cause of death in typhus. This only occurs in the latter days of the disease, preceded by the symptoms of the nervous stage, a fatal result taking place suddenly. As it usually happens on critical days, it may arise from the exacerbation, which then occurs, wholly exhausting the nervous powers; particularly as no morbid appearances, at all adequate to account for death, are observed on dissection. It differs but little from death by debility, excepting that the latter mode takes place gradually and slowly.

517. M. CHOMEL gives the following as the results of a very careful inspection of the encephalon in 38 cases: — Injection of the membranes,

in 4; œdema of the membranes, in 7; very slight general softening of the brain, in 6; effusion of serum in the ventricles, varying from a drachm to half an ounce, in 12; numerous red points upon dividing the cerebral substance, in 5; increased density of this substance, in 2; and the normal condition, in 15.

518. a. A fatal issue is evidently caused, or accelerated, in some cases, by the severity of the associated disease of the respiratory organs, preventing the necessary changes from being effected in the blood circulating in the lungs. It proceeds in others chiefly from the influence of the morbid blood upon the weakened irritability of contractile tissues, and particularly of the heart; and, in rare instances, from perforation of the intestines inducing general peritonitis, which soon exhausts the remaining powers of life. The lesions of the digestive mucous surface evidently assist in producing this effect; but in a much less degree than the depression of organic nervous power and of irritability, and the deteriorated state of the blood, with which they are intimately connected, and of which they are important effects. All these internal lesions evidently commence in the course, or even not until the advanced stages, of the disease; and, when developed, are analogous to the sphacelated sores and other alterations which take place in external parts in the more malignant cases. These internal as well as external lesions depend upon the anterior changes in the organic nervous power and irritability, and in the blood; they present similar characters; and, where even the slightest external lesions are observed, the existence or occurrence of those that are internal is to be feared. The most constant of these latter are discolouration and diminished cohesion of the intestinal tunics, distension of the intestinal tube by flatus, and enlargement and ulceration of the follicles, with inflammation or engorgement of the mesenteric glands. There are various other lesions associated with those; but they are different in different cases.

519. b. Since PETIT and BRÉTONNEAU directed attention to the almost constant change in the *intestinal mucous follicles* in typhoid fever, the subject has been further illustrated by the researches of LOUIS, ANDRAL, BRIGHT, CHOMEL, and others. But, although this lesion is so constant in the low fevers occurring in Paris and some other parts of France, it is certainly not so frequent in the same states of fever in this country; and, instead of viewing it as intimately connected with the nature of these fevers, I consider it as only one of several changes superinduced in the progress of the disease, but one of the most constant and important. The first alteration which these follicles present is enlargement or engorgement, owing to the formation under the mucous coat of a yellowish-white matter, slightly friable, which imparts to the agminated follicles the appearance of a thickened patch, and to the isolated follicles that of a pustule. To this state, which is generally preserved till the twelfth or fifteenth day, succeeds, in most cases, ulceration, beginning either in the mucous surface and extending to the whitish matter, or in this latter, which becomes softened and detaches the mucous coat from the parts underneath. These grades of lesion in the follicles almost constantly commence in those nearest the ileo-cæcal valve. From the

eighth to the fifteenth or twentieth day, the agminated patches, which have not experienced the above changes, present a reticulated appearance; their mucous covering being of a deeper colour than natural, softene partially detached, and perforated by numerous orifices of enlarged follicles. In proportion as these patches disappear by ulceration, or by sphacelation, the margins of the ulcers become either more level, evincing a disposition to cicatrization, or more elevated, owing to thickening of the submucous and muscular tunics. The ulceration generally extends in width and depth, and successively invades the submucous, muscular, and serous coats; ending at last in perforation; but death most frequently takes place before this last change occurs. Evidence of cicatrization is, in rare instances, observed, when the disease has been of long duration. Ulceration does not attack all the patches containing the enlarged glands; for resolution sometimes takes place, or absorption of the matter they contained.

520. c. The *mouth tongue*, and *pharynx* are frequently covered with a thick mucus, underneath which the mucous coat is often not manifestly altered. But in some cases, this coat is softened, discoloured, and studded with a few small round or oval ulcers, most of them not referrible to the follicles. The *œsophagus* occasionally is excoriated or slightly ulcerated. The *stomach* is variously coloured in its internal surface. It is sometimes pale, most frequently red in various grades, or purplish or brownish red, occasionally yellowish; and often the parts of the organ in contact with the liver and spleen have imbibed the colour of these viscera. — *Softening*, or diminished cohesion, of the mucous and submucous tissues, throughout the greatest part of the large curvature, or even the whole of the stomach, is observed in a large proportion of cases. The softening seldom extends to all the coats. Sometimes the mucous tunic is not only softened, but entirely destroyed, the cellular tissue or the muscular coat being denuded. It is generally easily detached from the subjacent parts. M. CHOMEL found, of forty-two cases, more or less extensive softening in fourteen. He remarks, that he observed softening of the internal coats of the stomach in the same proportion of fatal cases from small-pox. — *Thickening*, and great *tenuity* of the mucous coat, have also been seen but not so frequently as softening. Although M. LOUIS met with ulceration of the mucous membrane of the stomach in four cases, and M. ANDRAL in ten, yet M. CHOMEL did not find one instance in the forty-two inspections, of which he has given the details.

521. d. The *duodenum* and *jejunum* have occasionally imbibed the colour of the bile or of adjoining viscera. They are generally of a deeper red than the rest of the intestines. The *ileum* is usually more or less red, with numerous arborizations on the external surface; but more frequently the redness is seated chiefly in the mucous coat, and particularly in the margins of the valvulæ conniventes. In many cases, the redness is disposed in zones, between which the three coats of the intestine present a remarkable pallor. The redness and injection are not greater around the ulcerations and tumid patches of agminated follicles, than in other parts. Alterations of colour are not so common in the *large*, as in the *small*

intestines, the former presenting chiefly reddish or reddish brown patches, or ecchymosed spots. Softening of the mucous surface of the intestines, in the situation of the agminated follicles, or in the intervals between them, is seldom very great; the subjacent cellular tissue more frequently and decidedly presents this change. Induration is never observed in the digestive canal after typhoid fevers. In several cases, the mucous coat is remarkably tumid or thickened, presenting a gelatinous aspect, and various shades of colour from a bright red to a reddish black. This change varies in extent from two or three inches to as many feet, but is quite continuous, extending around the intestine. It is most frequently found in the ileum, but it may occur in any part of the small or large bowels. It arises from the infiltration of fluid blood into the mucous and sub-mucous tissues; for, upon pressing the part, the blood exudes through the pores, leaving the mucous coat almost in its natural state. M. CHOMEL observed this lesion in seven out of forty-two cases, and in all these there was hæmorrhage, either from the bowels, or into them. He also remarked it in other diseases, wherein intestinal hæmorrhage had occurred before death.

522. *e.* The mesenteric glands are very generally more or less changed, especially in connection with intestinal ulcerations. They are frequently only enlarged, sometimes softened, and occasionally both enlarged and indurated. In some instances, puriform matter may be traced in the sanious blood which they contain. They are usually only enlarged or indurated, or sometimes injected, in fatal cases which have not been of long duration. M. CHOMEL gives the following as the results in the 42 cases examined by him: — Enlargement, with commencing softening and suppuration in 14 cases, dead from the seventh to the twenty-fifth day of the disease; marked softening in 12, dead from the tenth to the thirty-sixth day; redness, enlargement, and induration in 10, who died after the nineteenth day; slight enlargement, with a bluish, purplish, and blackish discolouration, in 3 cases, dead after the seventeenth day.

523. It would seem that the mesenteric glands experience an analogous change to that of the follicles; that they become enlarged and softened about the same period as the follicles; and that, if the disease takes a favourable turn, they are gradually diminished, and assume their natural state. Suppuration is seldom observed in them, and ulceration never. The glands nearest the cæcum are those chiefly affected; and this is the part in which the follicles are most frequently and early diseased. M. CHOMEL does not think that ulceration of the follicles is the cause of the suppuration of the glands, as the latter may exist without the former. — I believe that softening of the mesenteric glands, with traces of puriform matter in them, may take place without any necessary dependence upon ulceration of the follicles.

524. *f.* The lesions observed in the other abdominal viscera are seldom such as materially to influence the termination of typhoid fevers. The liver is frequently more or less softened. M. LOUIS found this alteration in nearly one half of the fatal cases he examined. It is generally associated with softening of other organs, especially of the spleen. This viscus is enlarged in most of

the fatal cases; in one half it is increased to about double its usual volume, or upwards. It is always also softened — sometimes very remarkably so. The alterations of these organs seem to have little or no influence upon the symptoms during life. The same may be said of the lesions of the mesenteric glands. Even the ulcerations found in the intestines have no determinate relation to the phenomena referrible to the digestive canal. Diarrhoea is not a uniform result of this lesion; and pain is seldom complained of unless at an early stage, or until the peritoneal tunic is perforated. The ochrey appearance of the stools, noticed by Dr. BRIGHT, cannot be depended upon as an indication of this alteration; and meteorismus, or a tympanitic state of the abdomen, although often attending it, indicates chiefly extreme depression of vital power, evinced especially in the weakened irritability or tonicity of the intestinal tunics, throughout the whole tube, rendering them incapable of resisting the accumulation of flatus. Many of the symptoms referred, by Continental writers, to organic lesions of the bowels, originating either in inflammation, or irritation, are inseparable from the typhoid states of fever, and are the expression of the disease on the whole œconomy, rather than on this part of it in particular. That the affection of the digestive mucous surface and follicles is greater in some epidemics and countries than in others, and in large cities than in towns or country places, I am convinced from observation and the researches of modern pathologists. That it is more common in France, especially in Paris, than in England, is evident from the results of recent inquiries. Actual ulceration was found in *La Charité* by M. ANDRAL, in 92 cases out of 229 examinations; and only in 16 out of 54, by Dr. TWEEDIE in the fever hospital. The proportions, although different, show the frequency and importance of the lesion, and the necessity of guarding against its occurrence in the course of the disease. But the above changes of the intestines and mesenteric glands are not confined to typhoid fevers. They often take place in other fevers, whether bilious or gastric, mucous, synchoid, &c., particularly when these fevers lapse into a putrid or typhoid state in their advanced stages. Their frequent occurrence also in hectic is well known; and I believe that they would have been found still more frequently in all fevers, both continued and remittent, if the intestinal canal had been more generally inspected in that way in which only it can be said to be inspected, namely, by laying it open throughout its whole extent. That it has been very imperfectly examined in most epidemics, is evident, from the descriptions furnished of the morbid appearances, and from the circumstance of it having been very generally overlooked as late as the epidemics described by HILDENBRAND and others early in this century; and, although occasionally inspected by some of the writers upon the epidemic of Ireland, in 1817, 1818, and 1819, it was not until after the researches of BROUSSAIS, PETIT, BRETONNEAU, ANDRAL, and LOUIS, that attention has been generally directed to it. Making every allowance for the undue importance assigned to the lesions observed in this situation, the propriety of estimating them correctly, as to their origin and consequences, must be conceded.

525. *g.* The importance of the lesions observed in the *respiratory organs* has been alluded to. The *epiglottitis* has been sometimes seen oedematous. M. CHOMEL found it ulcerated, with denudation of the cartilages, in three cases out of twenty which were carefully inspected. The *larynx*, especially its superior aperture, is occasionally also the seat of ulceration. When ulceration is observed in either of these situations, it often also exists in the *pharynx*, in which it seems often to have begun; and it is generally found to consist of several small but deep ulcers, commencing in the form of pustules filled with whitish purulent matter, but without any surrounding injection, or inflammatory circle. — The *lungs* are often much diseased; but the alterations of them most frequently seen, occur only during the last days of life; and are referrible to the predominance of physical, over the vital, forces, as the disease approaches a fatal issue. But as congestion of the circulating fluids occurs in the more depending parts, the vital cohesion, particularly of the parenchymatous parts of the lungs, becomes diminished, giving rise to more or less marked *softening* of the engorged part. In less frequent instances, it is not only a simple congestion from stasis of the fluids that is found, but also indications of pneumonia in the first or second degree. The pneumonia is sometimes confined to two or three lobules; in which case it may have passed into a suppurative state before death: in other instances it occupies a whole lobe, but without any signs of suppuration. Œdema, or even emphysema, of parts of the lungs, is also occasionally remarked. The *bronchi* are generally red, or of a livid red, or violet colour. The tint generally deepens in the small bronchi, and in the direction of the air-cells. They also contain some mucus. — M. CHOMEL gives the following as the state of the lungs in 42 cases: — Congestion, with or without softening, in 18; hepatisation in the first degree, in 3; hepatisation in the second degree on one side, in 2; lobular pneumonia, in 3; emphysema, in 2; œdema, in 2; effusion into the pleura, in 2; and the normal state, in 10.

526. *h.* The state of the *blood* varies much in fatal cases of nervous, putrid, or typhus fever. Where the putrid, malignant, or septic characters have been most remarkable before death, the changes of the blood have been usually the greatest. — This fluid is commonly dark, black, diffuent; and but rarely in the state of fibrinous clots. In a few cases, the blood in the heart and large vessels assumes the form of black coagula, which are different from those observed in other acute diseases. This state is evidently owing to the absence, or great diminution, of fibrine. The presence of a gaseous fluid in the blood, especially in that of the veins, is also evident in some cases. I have observed this circumstance in death from other diseases, particularly if asphyxy was the mode in which the fatal event took place. (See art. *Blood*, § 110. *et seq.*)

527. *i.* The *heart* is often softened and somewhat discoloured. The *softening* of this organ varies from an almost unappreciable, to a most marked, degree. In some cases it is so great, that the fingers may be pushed through the parietes of the ventricles with ease. This diminution of cohesion is generally observed in cases where the changes in the blood, and softening of the liver and spleen,

have been the most remarkable. *Flaccidity*, or a state of softness different from that just mentioned, is still more frequent. The flaccidity may exist without very manifest loss of the cohesion of the structure; but it is generally attended by some degree of the latter, and the softening may be great, and yet the flaccidity not very apparent, although this is rare. — The *colour* of the internal membrane varies in different cases, and even in the opposite sides of the heart in the same case. In some, the membrane is red; in others dark, brown, or livid: it is often colourless, particularly when the heart is softened. It never presents inflammatory appearances, nor the changes immediately proceeding from the inflammatory state. — The researches of MM. TROUSSEAU, RIGOT (*Archives Génér. de Méd.* t. xii.—xiv.), and CHOMEL (*Clinique Méd.* p. 279.), show that the redness often found in the aorta, cavities of the heart, and large veins, in this class of fevers, is entirely owing to the tinging by, or to imbibition of, the colouring particles of the blood. Inflammation of the heart, or of its membranes, has not been observed in any case of these fevers.

528. *k.* The *external changes* observed after death most frequently commence a considerable time before this event. These consist chiefly of petechiæ, vibices, and blotches, varying as to size, situation, and depth of colour; and are to be ascribed to the extravasation of serum, coloured with red particles, or of blood itself, into the vascular layer of the skin. Gangrenous eschars, and sphacelus, are met with chiefly in parts pressed upon by the weight of the body, as the sacrum, shoulder blades, heels, and scalp of the occiput, or in those to which blisters, sinapisms, or other acrid substances have been applied. But these changes may occur in other situations, although rarely, and without these causes, as in the insides of the thighs; unusual pressure, or any other cause, either dissipating or exhausting the remaining vitality of the part, producing these effects. Phagedenic sores or ulcers, and enlargements of the absorbent glands, are also observed in rare instances. These sphacelating or spreading ulcers often commence in the form of pustules or vesicles, which break, leaving a foul sore which rapidly spreads. Besides these, the usual consequences of erysipelas are sometimes observed, or the remains of exanthematous and miliary eruptions. Even emphysema has appeared shortly before, and has remained after, death.

529. *B. Pathological conclusions.* — The *exposition* I have made of the organic lesions, more especially proceeding from typhoid fevers, suggests some important considerations, relative not only to the nature, but also to the treatment, of these diseases. Few of these changes become apparent before the seventh day from the invasion, when vascular action has passed into exhaustion, when organic nervous power and irritability are remarkably lowered, the circulating and secreted fluids are become morbid, and the powers of vital resistance in great measure overthrown. If inflammatory action should attack any part, either in this state, or even at an earlier stage, it will be very different, as to its phenomena, its progress, and its results, from inflammation occurring primarily, or in a system whose vital and physical constituents are not materially deranged. It is the remarkable affection of these

constituents by the causes of fever, and by the changes following more directly upon these causes, that imparts a similar character and termination to all the lesions now described. The depressed vital power of the extreme vessels, the lessened irritability of contractile parts, and the diminished vital cohesion of parenchymatous and other structures, heightened by the morbid state of the blood, are very frequently followed by gradual softening, infiltration, congestion, or effusion; and these often pass into disorganisation amounting even to sphacelation, or to sphaculating ulceration, even without the intervention of inflammatory action, or of any of its consequences. Owing to the intimate dependence of the states of the digestive canal, more especially of its internal surface, upon organic nervous influence, the former is involved, in a correlative manner, whenever the latter suffers. The tonic contractility of the muscular and serous coats of this canal is much diminished, the vital cohesion of its mucous membrane is weakened, the tonicity of the extreme vessels of this coat is lessened, and its functions of secretion impaired or otherwise changed. In this state, it is unable to resist the impressions made by morbid secretions passing over it. The alterations which had previously taken place in the organic nervous influence, in the functions of respiration, and in the blood, have conjointly given rise to diseased—usually acrid, or irritating—secretions from the liver, pancreas, and even also from the intestinal surface. When we find these secretions produce spreading or sphaculating sores, as they often do, in the protected cutaneous surface, we cannot be surprised at their occasioning analogous lesions in the more delicate mucous surface of the intestines, rendered still more delicate and susceptible of lesion by the previous changes just described. During the several days of the patient's life, from the commencement of these changes, or from the presence of morbid secretions in the intestinal canal, absorption will proceed on the digestive mucous surface; and, notwithstanding the amount of absorption may be very small, yet we cannot conceive it possible, that morbid secretions, either floating through the intestines, or collected in the follicles, will pass through absorbent glands, or even into the vessels which run to them, without producing a material change in them. If these views be just, the inference that depressed organic nervous influence and irritability, a morbid state of the blood, and disorder of the secretions, are concerned especially in causing the changes of structure observed in the digestive canal, will be admitted; and, if admitted, it becomes the basis of a rational method of treatment. But these early pathological states induce also those organic lesions in typhoid fevers, affecting other internal organs, and even other external parts, and stamp them all with the same important characters—characters indicating both a common origin and a similar tendency, and pointing to the same principles of cure.

530. viii. TREATMENT OF TYPHOID FEVERS.—The treatment of this class of fevers is the most difficult in practical medicine. If the physician possesses not just views as to the different and varying states of vital action, and as to their influence in producing organic lesion—if he be not enlightened as to physiological pathology, as well

as to pathological anatomy—if his knowledge of the instruments of his art be not adequately varied and comprehensive—if his resources be not great and based on science—he administers to a patient in any of the forms of typhoid fever, with an equal chance of doing mischief, or of affording benefit; and he may as well adopt his plan of treatment from the “hazard of the die,” as to attempt to reason on the matter. It is better that the patient were left to the spontaneous efforts of nature, than that he should fall into the hands of such a practitioner. If we look back to the influence of theory and system in the treatment of these diseases; to the importance bestowed on names; and to the manner in which names have been confounded with, or substituted for, indefinite and varying entities; we shall not be at a loss to explain wherefore it has often been a matter of difficulty to decide, whether or not medical interference has proved beneficial or injurious. This is, however, not an opprobrium to our science; but a proof of its difficulties, and of the ill-founded pretensions of many of its professors and teachers. In our own days, we have seen pretensions to which ignorance gave confidence, and for which professional cant procured currency, obtain a credence which now seems surprising, and produce results which the adequately informed always anticipated. We have witnessed the promulgation of doctrines, and of modes of practice, warranted neither by an acquaintance with vital actions, nor by a knowledge of, or regard to, facts, lead to the most serious consequences; and have remarked, moreover, the power they obtained over those who were either unwilling or unable to inquire into their truth. But we have also seen, in the brief space of two or three years, the illusion vanish before the increasing and spreading lights of pathological and practical knowledge.

531. The difficulties attendant upon the treatment of this class of fevers depend chiefly upon the varying states of vital action in their course; the modifications and complications they present in different circumstances and epidemics; and the inadequate means of discrimination in our power, between the changes induced by treatment and those taking place spontaneously.—It is not also from the effects produced upon a few detached cases, that we can judge sufficiently of the efficacy of certain remedies; but from the results in a number—from the rate of mortality in various circumstances, and in different epidemics. Whatever may have been the method advised by writers—too many of whom have written from motives wide from those by which alone they ought to have been actuated—we shall find, upon close inquiry, that the general mortality has been such as to demonstrate its little efficacy, or to show the small superiority possessed by it over others.

532. The ancients observed the changes which take place in the course of fevers with great attention, attributed recovery to the critical evacuations which frequently occurred in their advanced stages, and did not attempt to interfere with the efforts of nature as long as the disease pursued a simple and mild course; but interposed in order to accelerate and replace evacuations, when they did not occur after a certain period, or were interrupted by any circumstance. The chief fallacy in this doctrine is, that the evacuation, when it

occurred, was mistaken for the cause of the amendment, instead of being viewed as the effect, and as one of the signs by which this change is often indicated.

533. The physicians who, in modern times, attributed an important part to putridity of the humours, recognised merely a portion of the mischiefs, and that often the most remote and contingent, and mistook, in great measure, both its origin and nature. They had recourse to camphor, bark, musk, and various preparations, both vegetable and mineral, possessing antiseptic properties; and, if they had employed them in appropriate periods and states of the disease, the benefit derived from them would have been much less equivocal. But, mistaking the origin of the phenomena usually called putrid, they frequently prescribed these medicines improperly; and whilst endeavouring by an early exhibition of them to prevent putridity, they actually often accelerated or favoured its occurrence.

534. A nearly similar mode of treatment was advised by BROWN, and his once numerous followers on the Continent; but it was based upon a different doctrine—upon the predominance of the asthenic diathesis and its consequences. Although wine, opium, tonics, and stimulants, were recommended by them, in various forms and combinations, with advantage, in certain states of typhoid fevers, particularly in the latter stages; yet the evils resulting from an early recourse to them were also sufficiently evident, and at last became manifest even to the disciples of this school. That this practice, and the modifications introduced by its partisans, did not prove so injurious in the treatment of fever, especially on the Continent, as may be supposed, is accounted for by the circumstance, that depressed vital power, with septic changes in the fluids in the last stages, characterised the much larger proportion of fevers prevalent for several years after its promulgation. But the appearance of exanthematic typhus in the north of Italy, at the close of the last century, opened the eyes of RAZORI to the impropriety of having recourse to stimulants in its treatment, and laid the foundation for the doctrine and practice of *contra-stimulus*. The general character of the petechial fevers prevalent about the commencement of the present century in Italy and Germany, was such as I have delineated in the section on typhus (§ 497.), with more or less of inflammatory or irritative action in the stage of excitement; the exanthematic eruption in this stage being frequently mistaken for petechiæ, and the appearance of these, and of other adynamic symptoms, being favoured by the vascular reaction which preceded them.

535. The administration of *tartarised antimony*, in large doses, was the principal treatment employed by RAZORI. When the patient was young and robust, and the disease had not reached the acme of excitement, he directed moderate bloodletting at the outset, and, immediately afterwards, four, six, eight, ten, or twelve grains of tartar emetic, or even more, in solution. He prescribed this medicine in smaller doses subsequently, or substituted for it the *kermes mineral*, conjoined with nitre, and in doses of one grain, or of a grain and a half, every half hour, or hour, or every two hours, according to the degree of vascular excitement. He often gave the tartar

emetic and kermes alternately. RAZORI also employed purgatives, particularly when the antimony did not act sufficiently upon the bowels; referring neutral salts, manna, and tamarinds, in large doses, and administering them, in other cases, in enemata. He enforced a cooling regimen and severe diet, and allowed only refrigerant beverages. The success of this treatment is stated to have been great; and its propriety, as well as success, may be admitted, when employed in an epidemic characterised by high vascular excitement at its commencement, and when adopted sufficiently early after reaction has taken place, and in previously healthy persons. But in other states of typhoid fever, and in the latter stages especially, the large doses of antimony here advised appear not, *a priori*, to be suitable means. It should, however, be admitted, that the exhibition of tartarised antimony in the advanced stages of this fever has never been satisfactorily tried, either in this country or in France and Germany. That it may be found not so inappropriate as generally considered, is an inference which the trials made of it, very recently, by Dr. GRAVES, of Dublin, fully warrant.

536. The pathological tenets lately prevalent in France have, as M. CHOMEL states, prevented the treatment of RAZORI from being adopted, or even tried, in that country. The doctrine of BROUSSAIS was opposed to this and every other means that seemed to its supporters likely to aggravate the inflammatory action of the digestive mucous surface, which they suppose to be the cause of all fevers. If we examine the practical tenets of this school, we shall find more than one postulatatum assumed as fully established, although admitting not only of doubt, but even of disapproval. That fever does not depend upon this lesion, although predominant morbid action in the digestive canal may appear in many cases, and in some fevers more frequently than in others, has been already shown. And, granting that this morbid action is attended by vascular injection of the mucous membrane, it still remains to be proved, that it is the same kind of affection as inflammation. That it is not the same as primary and sthenic inflammation, its phenomena and results, as well as the *jurantia* and *ludentia*, sufficiently prove. Even granting the doctrine of BROUSSAIS in its fullest range, it still remains to be demonstrated, that the treatment advised is that which is the most beneficial, or the most appropriate, in the numerous and varying morbid conditions which fevers assume; and it, moreover, should be shown, that the means which the espousers of this doctrine reprobate, are one whit more prejudicial than those which they laud. In a class of diseases so varying, and even opposite, as to their pathological states, as fevers are, not only in their different forms, but also in the same case at different stages, the success of various remedies cannot be predicated from doctrinal tenets. However ingenious the theory, and close the reasoning, by which we are led to practical inferences, careful experiment and repeated observation are necessary to test the character of any method of cure; and even were we to adopt the views of BROUSSAIS, to these tests we ought to resort before we should decide between the efficacy of gum-water and leeches on the one hand, and that of antimony and purgatives on

the other ; or, indeed, respecting the propriety of any remedy whatever.

537. The pathological views of HOFFMANN, and the modifications of them by SAUVAGES and CULLEN, although entirely based upon solidism, were favourable to rational modes of practice. These views, in the varying explanations of them furnished by HEBERDEN, FORDYCE, and others, have very generally guided practitioners in this country in the treatment of typhoid fevers, until Dr. HAMILTON introduced a modification of the usual practice, or induced them to have a more frequent recourse to purgatives than had previously been ventured upon. That these remedies, especially when judiciously selected and combined, do not produce the mischievous effects in typhus which BROUSSAIS supposes them to produce, even when given in cases the most favourable to his views, I am convinced by experience, and many of his disciples are at last opening their eyes to the fact. MM. BRETONNEAU, ANDRAL, and others, more or less partial favourers of his doctrine, have recently so far discarded the practical tenets of their school, as to venture on the exhibition of these medicines ; and, as M. CHOMEL justly remarks, have found that the dread of them so long entertained is unjust, and that they may be employed early in many cases of typhus with great benefit. Where, however, there is reason to suspect the existence, or even the commencement, of ulceration, the impropriety of having recourse to them, unless with the circumspection and in the manner hereafter to be mentioned, cannot be doubted. But ulceration seldom occurs before the twelfth day of the disease ; and if they have been judiciously employed previously, I believe that it will very rarely take place either then or at a later period.

538. The humoral pathology, although superseded very generally by solidism, since the days of HOFFMANN, still continued to be partially adopted by some practitioners in different parts of the Continent. It has been lately revived in a too exclusive manner in this country. Amongst those who have espoused views of this kind may be mentioned, Dr. STOKER, Dr. CLANNY, and, still more recently, Dr. STEVENS—each of whom has endeavoured to establish the early predominance of morbid states of the blood. These views have been already partially discussed ; and I have now nothing further to add respecting them, than that the changes of the blood for which Dr. STOKER argues, are those which have been above stated (§ 526.), and which refer merely to its external appearances. Dr. CLANNY insists chiefly on the diminution in typhus of the carbonic acid, which he supposes the blood to contain in health. He recommends the use of fluids containing, or evolving, this gas, as effervescent draughts, Seltzer water, &c. M. CHOMEL states, that he gave this practice a trial in the Hôtel Dieu during two years ; and that, although the cases in which he employed it were not numerous, they satisfied him that it did not influence the usual results, and that he preferred, therefore, to try other means, the inefficacy of which had not been so fully shown. Of the treatment of Dr. STEVENS, in respect of this class of fevers, I entertain similar opinions to those expressed above (§ 382.). In two cases of low nervous fever to which I was lately called, at a period, however, too late to

expect benefit from any treatment, I prescribed the remedies this writer has advised, but without any effect.

539. If the rational method of treatment, or that which is modified according to the form, state, or stage of the disease, is not much more successful than that which is dictated in the spirit of system, or of empiricism, it has at least this to recommend it,—that it brings the results of science to bear upon existing pathological states, both vital and structural. Although not admitting so readily of the usual tests of success as more empirical methods, the experienced physician will readily form a tolerably accurate idea of the circumstances, either promoting or preventing favourable results. He will make due allowances for the forms and periods of the disease, the characters of the epidemic, the influence of season, and for the numerous circumstances appertaining to individual cases ; and he will at once perceive, that the means that are beneficial in one epidemic, or in one form of fever, or in certain cases, will be most injurious in others. In the present state of our knowledge, the rational method of cure is that which is most appropriate to the different varieties and stages of fever. According to it, indications or intentions are derived from a due estimate of existing symptoms and signs, and of the pathological conditions evinced by them. Whilst it comprises every method of cure, and all kinds of means, it adapts them to the states of the disease and of the patient. The judicious physician employs, according to circumstances, remedies the most opposite ; and, in different cases, or in different periods of the same case, he has recourse to sedatives, to refrigerants, to evacuates, to tonics, to astringents, to stimulants, or to antiseptics. He neglects no means, but adopts none exclusively ; and, while interpreting the value of symptoms, and inferring the morbid states producing them, he endeavours to select and to combine the medicines, whose known operations are such as are most likely to remove these states, or to prevent the accession of others usually supervening in the course of the disease, and increasing its danger.—I will now proceed to consider—1st, The treatment appropriate to the different stages of typhoid fever ;—2dly, The modifications required by its different forms and complications ;—and, 3dly, The means recommended in a special manner, and the circumstances or states of the disease in which they may afford benefit.

540. A. The Treatment appropriate to the stages.—a. In the premonitory stage, and whilst that of invasion is not fully formed, the future fever may be checked or prevented by the shower bath, followed by frictions of the surface ; by an emetic, or by a warm stomachic purgative ; or by a warm or vapour bath ; or by all these following in succession ; and in some cases, also, by warm diluents or diaphoretics ; but this result cannot be depended upon.—b. When the stage of invasion is pronounced, bleeding, hot stimulants, &c. are hurtful, or even dangerous. Tepid and warm diluents, and the warmth of bed, are the most suitable means. If vomiting accompany this stage, it may be increased by tepid and emollient diluents. If nausea only be complained of, and if there be little pain, tenderness, or tension, in the hypochondria and epigastrium, an emetic may be given, and its action promoted by these means.

—This treatment will generally shorten the chills, &c. characterising this period, and favour a relaxation of the surface, or the occurrence of moderate reaction.

541. *c.* In the *stage of excitement*, the treatment must altogether depend upon the degree in which reaction is developed, and the manner in which the brain, the lungs, or the digestive canal, appears to suffer. If the fever does not present, early in this state, the characters of low nervous fever, to their full extent, or those of an adynamic, or of a putrid or septic kind, then a small or moderate *bloodletting* may be prescribed; but the effects at the time of the operation should be carefully observed. If the patient be young, or robust, previously healthy and well fed, then a more copious depletion may be practised, if he be seen early. Even in the lower states of this fever, if any of the viscera just named be prominently affected, a *local depletion*, either by leeches or by cupping, may be employed. But if the period of excitement be far advanced; if the fever be simple or mild; if it have passed the tenth day; and if it be the true or exanthematic typhus, unattended by inflammatory associations; bloodletting will seldom be of service, and it may interrupt the regular and favourable course of the disease, particularly the latter form of it. In a large number of cases, in which M. Louis states bloodletting to have been tried, and in which it appears to have been indicated, the advantage procured by it seems to have been slight; but sufficient to increase, to a small amount, the proportion of recoveries, and to diminish the duration of the disease.—*Emetics* have been advised also in this stage; and, in cases where the chills return on successive days, or frequently alternate with flushes, I believe that they will be found of service. HILDENBRAND directs them in the first, second, or third day, or even later; having premised a bloodletting in the cases indicating it; and prefers a large dose of ipecacuanha, with a grain of tartar emetic.—Next to emetics, *purgatives* are of advantage. At an early period, or before the eighth or ninth day, a full dose of calomel, either alone or with rhubarb, may be given; or jalap, with cream of tartar; and their action promoted by moderate doses of the neutral salts, or by manna, tamarinds, &c., according to circumstances. These clear away morbid secretions, and mucous sordes, from the digestive surface; which, if allowed to remain, would favour the occurrence of the morbid changes in the intestines. If, however, the bowels have been much relaxed, and still continue so, it will be preferable to give an occasional dose of hydrargyrum cum creta, rhubarb, and ipecacuanha, which will promote a healthy state of the mucous surface, and facilitate the evacuation of morbid secretions. If the bowels be only gently open, the circumstance is favourable; but an inordinate action of them must be moderated by the above medicine, or by others hereafter to be mentioned, lest intestinal ulceration and perforation be the ultimate result. At the same time, care should be taken not to produce a sudden change or constipation, otherwise the cerebral or nervous symptoms will generally be much aggravated, and a tendency to effusion on the brain be produced.—*Diaphoretics*, suitable to the state of the symptoms, either variously combined, or associated with diuretics, may be given

from time to time. Of these, the more refrigerant, with small doses of camphor, will be most serviceable; and either some one of those in the Appendix (F. 431. 436. 440. 818. 865.), or the following, may be prescribed:—

No. 225. R Camphoræ rasæ gr. ss.—J; Potassæ Nitratæ gr. ij.; Pulv. Acaciæ gr. ij.; Mucilag. Acaciæ q. s. M. Fiat Pilulæ ij. quartis horis sumende.

No. 226. R Mist Camphoræ ʒj.; Liq. Ammoniac Acetatis ʒij.; Ammoniac Moriatæ, gr. iv.; Syrup. Limonis ʒj. M. Fiat Haustus, quartâque horâ capiendus; vel interdum, secundis horis, pilulæ et haustus, alternis vicibus, sumantur.

542. *d.* In the *nervous stage*, the debility is more real; irritability is more exhausted, and the sensorium more severely and uniformly affected. The functions of the skin, and frequently those of the bowels, are also more disturbed than before. The *indications* are to support or stimulate the system, according to the forms the disease assumes.—*Blisters* may be employed in this stage—seldom before. They favourably impress the nervous system, check the tendency to diarrhoea and affection of the intestinal mucous surface, and render the skin more perspirable. They are most serviceable at the commencement of this stage; and are best applied on the nape of the neck, behind both ears, or on the calves of the leg.—*Camphor* is now one of the best remedies that can be exhibited. Whilst it promotes nervous power, it relaxes the skin, and does not increase inflammatory action, but rather tends to allay it, particularly the nervous and cachectic forms of it, which alone can exist in this disease. It should be given in larger doses in this stage, especially of the malignant or putrid form, from twelve to twenty grains may be exhibited in the twenty-four hours. HILDENBRAND advises in the latter part of this stage, medium doses of camphor; or one grain every two hours, with an infusion of *arnica* and *angelica* root. He considers that those lessen the stupor, giddiness, and delirium; act favourably on the skin, and prevent the tendency to diarrhoea.—*Emetics* are sometimes beneficial in this stage, when they have been neglected in the previous one, or contra-indicated.—*Purgatives* are of service only when the bowels require assistance. They should be given with the intention of evacuating morbid matters, of preventing the injurious impression made by such matters upon the intestinal mucous surface, and of promoting a healthy action of the abdominal emunctories. Hydrargyrum cum creta, and rhubarb, and the infusion of the latter with the milder saline substances, in a state of effervescence, are the most appropriate. These preserve the tone of the digestive mucous surface, whilst they enable it to throw off faecal collections. Their action may be occasionally promoted by emollient and gently laxative enemata. I doubt much the propriety of exhibiting *calomel*, or any of the drastic purgatives, in this stage; and I believe that the more active neutral salts exhaust the strength, and produce watery stools, in this period, particularly if they be exhibited in any quantity. It is in the common, or synchoid, form of fever, or at the commencement of this, that they may be employed. In the latter stages of low fevers, calomel and cathartics are apt to increase the intestinal symptoms, or to determine an irritative action of the bowels, liable to terminate in the lesions already noticed.

543. *e.* When the disease has reached its *acme*,

or is approaching the fourteenth day, the treatment should very much depend upon the predominant symptoms, upon what has been already done, and on the effects observed.—If no unfavourable symptoms are present, mild saline *diaphoretics*, as camphor mixture, with liquor ammoniæ acetatis, &c., or the former with the alkaline carbonates, and citric acid, or lemon juice, in effervescence, and mild demulcent diluents, are all that are required. The chief intention at this stage is to favour a genial perspiration. The temperature of both medicines and drinks should not be lower than tepid. If the disease is complicated, particularly at this period, or is proceeding irregularly, the treatment must be varied, as will be hereafter shown. If a crisis take place, or the more urgent symptoms gradually subside, the means should vary with the degree of vital depression evinced. Both tonics and stimulants should at first be mild, in moderate doses, and suited to the state of the pulse, and of the skin and bowels. At first a cold infusion of *cinchona*, or the decoction, may be given with the solution of the acetate of ammonia, or with either of the alkaline carbonates and citric acid, in effervescence. The infusion of *valerian* may also be substituted for the *cinchona*, and given as directed above.—The *regimen*, diet, and *convalescence*, should be managed with strict reference to the forms and complications of individual cases, and as will be hereafter shown.

544. B. The Treatment of the Varieties and Complications of Typhoid Fever.—a. In the simple typhoid, or nervous fever, when it commences as described (§ 469.), the period of excitement is characterised by little or slight reaction, by which it is seldom beneficial; or local bleeding, if the situation indicated by the prominent vessels, will only be required. If the pulse be very rapid, or soft, and open; if the prostration be great, and the tongue assume a dark colour; and particularly if this state exist at the commencement of the disease; vascular depletions will be injurious. The indications enumerated above (§ 132, 133.) will further serve to point out when they may, or may not, be resorted to.—An *emetic* is always of service, particularly if there be nausea; and if vomiting be spontaneous, it should be moderately assisted, as already advised.—The bowels should be evacuated early in the disease by mild *purgatives*. Those already mentioned are the most appropriate, or fresh castor oil may be used. They may be repeated occasionally, with the views I have stated, but with due caution, lest they induce too great exhaustion, or favour the supervention of intestinal disorder.—Whilst the heat of skin continues, *tepid* or *cold* sponging the surface is grateful to the patient, diminishes the restlessness, and favours the operation of *diaphoretics*, during the state.—If diaphoresis occur, it should be promoted by mild, tepid *diluents*, either simple or medicated, in the manner about to be noticed. If copious perspirations occur, especially about the acme of the disease, or at a critical time, they should not be arrested, unless they increase the exhaustion, or are attended by signs of septic deliquescence.—In the *nervous stage*, the treatment directed above should be employed (§ 542.).

545. a. Prominent affection or consecutive inflammation of the respiratory organs, in the nervous form of typhoid fever, requires the utmost dis-

crimination on the part of the practitioner, for its successful treatment. The subject has been admirably elucidated by Dr. Strokes, in his truly excellent published lectures on fever. The chest should be carefully examined by the stethoscope, in order to ascertain, as accurately as possible, the state of pulmonary disorder, and to determine whether the symptoms referred to this organ be symptomatic, or dependent upon inflammatory action, or active congestion. The able pathologist just mentioned remarks that, when the bronchial surface is chiefly affected, there is much more lividity of the countenance, than when a portion of the substance of the lungs is diseased. This symptom will generally verify the reports of auscultation. But the treatment will entirely depend upon the nature of the bronchial affection. If the dyspnoea and other pulmonary symptoms depend upon inflammatory irritation, rather than upon increased secretion from the mucous surface; if there be heat of skin, more or less vascular reaction, and if the patient be young and robust; *bleeding*, general or local, will be necessary, according to the severity of the symptoms, and stage of the disease. If, however, these symptoms depend chiefly upon a copious secretion from the bronchial surface, as will be shown by the stethoscope, bleeding will be most injurious, and very decided means of an opposite nature will be requisite, in order to prevent contingent asphyxy. In this latter case, extensive counter-irritation, the *mistura ammoniaci*, or the *decoctum polygalæ*, with camphor, ammonia, the *tinctura camphoræ composita*, or other stimulating expectorants, must be resorted to, according to the urgency of the case, particularly if lividity of the face exist. When the strength is very much reduced, *wine* will also be necessary, with light nourishment. The temperature of the surface should be kept up. Dr. Strokes very properly directs the patient to be enveloped in soft flannel. When the bronchial affection is more strictly inflammatory, and the secretion does not interrupt materially the functions of the lungs, antimonials may follow the bleeding. But in either case, if the symptoms referred to this organ, particularly the dyspnoea, or the cough, become urgent, and be attended by the tracheal rattle, an *emetic* of *ipeacacuanha*, or of sulphate of zinc, should be immediately exhibited. In this state, Dr. GRAVES, whose extensive resources, in matters of difficulty, I have had frequent occasion to notice, has tried the application of *moxas* in the course of the eighth pair of nerves, and the use of the sulphate of quinine and opium, in enemata; these latter exerting a powerful influence, in his opinion, in lessening excessive secretion from the bronchial surface.—If the substance of the *lungs* be affected, a single moderate bloodletting, or local depletions, may be prescribed, if the patient be robust and the disease not far advanced. If the bowels be not materially disordered, antimonials may afterwards be given; but they should be combined with anodynes. *Ipecacuanha*, with calomel or camphor, and opium, or extract of poppy, is, perhaps, preferable in most cases.—*Diaphoretics* in frequent doses are always of service, and may be conjoined with diuretics. After depletions have been carried sufficiently far, or if the lungs are affected very late in the disease, *blisters*, *sinapiams*, or the warm terebinthinated embrocation, placed on the chest,

and camphor, ammonia, ipecacuanha, or other expectorants, with hyoscyamus, or extract of poppy, are the principal means we possess. When, in this complication, the skin is cool and pale, the pulse very weak and small, and the features collapsed, the warm expectorants, as polygala, ammoniacum, ammonia, camphor, the stimulating tonics, and wine, should be given, according to the peculiarities of the case.

546. *β. Predominant affection of the intestinal mucous surface* should be treated by means similar to those advised in this complication of synchus; and the more especially, as the latter fever, when thus characterised, either passes into, or is very nearly allied to, the typhoid form. In the early stages of this complication, a combination of small doses of hydrargyrum cum creta, rhubarb, and Dover's powder, with compound cretaceous powder, given every three or four hours, is generally of service. If the constitutional symptoms will permit, and if this affection appear at an early period of the fever, a local depletion should be premised, and a blister or sinapism be afterwards placed upon the abdomen. The terebinthinated epithem, applied sufficiently hot, and covered so as to prevent evaporation, if properly managed, is the most efficacious means—more particularly if the abdomen be tense, tender, or tympanitic. In this latter state, an injection with assafoetida, or with the extract of rue, or with from two drachms to half an ounce of spirits of turpentine in addition, will give great relief.

547. In a far advanced stage, *diarrhœa*, especially if attended by tension, pain, or flatulent distension of the abdomen, requires great attention. If the medicines just recommended prove not of service, the *chlorurets*, particularly the chloruret of lime, may be given, with camphor, and extract of poppies, &c. Mucilaginous injections, containing syrup of poppies, or laudanum, or compound tincture of camphor, may also be administered, and a rubefacient epithem placed over the abdomen.—If *hæmorrhage* from the bowels occur, it may be ascribed chiefly to exudation from the softened mucous surface, as shown by the post mortem appearances; and *supercetate of lead* with opium, or acetate of morphine, or extract of poppy, should be exhibited, either in the form of pill, or with the pyroligneous acetic acid, in strong camphor julap. The lead has been recommended, in these cases, by Drs. BARDESLEY, GRAVES, and STOKES. I have resorted to it in these several combinations, and have given it in two or three instances with kreosote.—I have likewise employed, by the mouth, and in enemata, the spirits of turpentine, which generally proves the most active remedy of any in such circumstances. In some hopeless cases, it has succeeded contrary to expectations. In one, however, that recently occurred to me, although it arrested the hæmorrhage for a time, there was a return which carried off the patient. If the disease be far advanced, or the powers of life much reduced, the turpentine should be given in small or moderate doses, and its effects carefully watched. I have also prescribed it in conjunction with kreosote, the acetate of lead and aromatics, in similar circumstances.

548. *γ. Prominent affection of the brain* may arise in the course of typhoid fever, either from congestion within the head, or from the depressed

state of nervous power, unconnected with inflammatory action, or even with vascular determination. This circumstance, long believed by pathologists, has been fully confirmed by M. J. LOUIS, who found, that the presence or absence of delirium has little or no connection with perceptible organic lesion of the brain. If, however, there be increased heat or severe pain of the head, spastic contractions of some muscles, flushed face, injected eyes, or other indications of active disorder of the cerebral circulation, particularly in the stage of reaction, the hair should be removed, and local depletion resorted to. The head ought to be kept cool, by cold sponging, or lotions. If delirium be attended by these symptoms, the same means are required; and, if it be, at the same time, low, insensible, or muttering, a blister should be applied to the neck and nape, or behind the ears, or to the calves of the legs, or a sinapism may be substituted in the latter situation. Whenever the affection of the head is connected with increased determination to it, especially in an early stage, stimulating antispasmodics, as ammonia, musk, or camphor in large doses, cannot be of service, and may be injurious. The last of these, however, may be used in small doses with nitre, and it may be increased according to the degree of stupor, and coolness of the scalp. If the delirium depend upon exhausted nervous power—if it be attended by stupor; by a weak, soft and very quick, or somewhat slow pulse; by a moist skin, or copious perspiration; or by extreme prostration, particularly after the eighth or tenth day, or in the nervous stage; camphor in doses of from one to three or four grains every two, three, or four hours; or the preparations of valerian, or of serpentaria, or of arnica, or ammonia, or of ether, or wine or opium, may be severally employed as circumstances will suggest. In other respects, the treatment of this state, and of sopor and coma, its frequent attendants and sequents, should be directed, as explained in the articles COMA (§ 16. 19.), and DELIRIUM (§ 16. 17.).—*Retention of urine* is very apt to occur in this state; therefore, in it especially, but also in all others, attention ought to be paid to the circumstance. If an undue accumulation of water in the bladder be detected upon examining the hypogastrium, it should be immediately drawn off.

549. *δ. In the most severe form of nervous fever* (§ 476.), bloodletting is seldom of service, unless at the commencement of reaction, or from the vicinity of the most affected organ. When the skin is very hot, tepid sponging, diaphoretics, external derivatives, and emollient diluents, with nitre, or small doses of the muriate of ammonia, are the most appropriate. The infusion of valerian may be given as the disease passes into the nervous stage, either with the ammoniated tincture or with camphor, and muriatic ether, or other stimulants.—HILDENBRAND advises the arnica montana with camphor, in this state.—If exhaustion increase, and coma come on, these medicines, or others of a similar kind, may be prescribed in larger doses, or at shorter intervals; and a blister applied to the vertex, or occiput, or to the nape; or a large sinapism to the epigastrium, or inside of the legs. LALLEMAND and MACKINTOSH have adduced instances of benefit, in the comatose state, from pouring boiling water on the lower

extremities. *Musk*, the *ethers*, preparations of *cinchona*, or any of the stimulants already mentioned, may likewise be tried, in various combinations, in this stage; or an infusion of *green tea* may be given in the usual manner.

550. *s.* If the disease be sudden in its attack, or *apoplectic*, care should be taken to ascertain whether or not this character arise from weakened nervous energy of the brain, or from vascular congestion. When a pale, collapsed countenance and eyes, weak and small pulsation of the carotids, and coolness of the scalp, indicate the former, restoratives will be necessary. But, when there are increased temperature of the head, and excited action of the carotids, although the countenance be pale, a small or moderate bloodletting, local or general, or even a cautious repetition of it, in young or robust persons, will generally be required.—The same remarks equally apply to the occurrence of *paralysis*. If the paralysis appear at an advanced stage, even local depletions may be injurious. In this case, we must trust chiefly to blisters and other external derivatives, and to the means already stated (§ 548.).

551. If, in the early stage of this, or, indeed, of any other form of typhoid fever, the thirst be urgent and attended by vomiting, desire of cold fluids, and heat of skin, stimulants are generally injurious. If tenderness of the epigastrium accompany these, inflammatory irritation, or *erethism*, of the gastro-intestinal mucous surface should be inferred. In this case, *leeches* ought to be applied; and cold or iced drinks, and saline medicines, particularly the nitrate of potash, or the mu. i. at. of ammonia, frequently exhibited. A combination of camphor mixture, the solution of the acetate of ammonia, nitrate of potash, and spirits of nitric ether, will generally be serviceable in these circumstances. Effervescing draughts are productive of little benefit, as the extrication of fixed air distends the stomach, and either causes it to react upon, and throw off, its contents, or gives rise to much distress and pain. If irritability of the stomach still continue, a large blister may be applied over the epigastrium. Dr. Stokes advises, in the more obstinate cases, the raw surface to be sprinkled with a small quantity of the acetate of morphia. I have rarely found the warm turpentine embrocation fail of removing this state of disorder, when properly employed.

552. *z.* When *singultus* occurs in the stage of reaction, it is generally connected with the foregoing state of the stomach, and particularly with irritation about the cardiac orifice. In this state, the treatment just advised is the most appropriate. When it appears in the nervous period, or later, it depends upon exhausted nervous energy; and requires stimulants, antispasmodics, and anodynes. Camphor, ammonia, the ethers, musk, valerian, opium, and their preparations, variously combined, are the most serviceable.

553. *n.* *Diarrhœa* is one of the most frequent precursors of disease of the intestinal mucous follicles; yet should it not be rashly interfered with, and still less abruptly arrested, particularly when it occur early, or at a critical period. I have imputed the affection of the intestinal mucous surface in great part to the morbid condition of the blood; this surface being one of the channels by which effete, or injurious materials, pass out of the circulation during the course of fever. It is

evident, therefore, that if we shut it up, without opening others, the alterations of the blood will increase, and occasion serious organic changes, and ultimately a fatal issue. The most rational procedure, when diarrhœa is an early complication, is not to interfere with it, unless it become severe, or continue long; and then it should be moderated rather than arrested, and by such means as will increase the depurating functions of the skin, the kidneys, and liver, and remove the irritation excited in the digestive mucous surface and follicles. The remedies most likely to produce these effects, are actually those which have been found most serviceable in this state of disease. *Hydrargyrum cum creta*, compound *pecacuanha* powder, camphor, nitre, mild anodynes, variously combined with demulcents, emollients, and diluents, are the most generally of service. In more advanced states of this complication, and in later stages of fever, those medicines which have been already noticed (§ 156.), as well as some about to be mentioned, may be resorted to.—When the pulse is small, very frequent, and weak, and the strength exhausted, diarrhœa must then be arrested, otherwise it will speedily terminate life. Astringents, opiates, absorbents, restoratives, wine, &c., are all requisite in this case.

554. *θ.* *Tympanitic distension* of the abdomen may occur early in this fever, and be attended by thirst, by a desire of warm diluents, by tenderness on pressure, particularly in the lower part of the right side of the abdomen, and by diarrhœa. When these symptoms are present, disease of the intestinal mucous follicles may be inferred. In this case, a number of leeches, according to the strength of the patient, and stage of the fever, should be applied, and followed by the warm turpentine embrocation on the abdomen. If tympanitis and diarrhœa appear late in the disease—particularly if the stools be foul, watery, or mucous—ulceration of the intestinal surface should be dreaded, and the means already advised (§ 156.) should be resorted to; or the chlorurets given in the infusion of valerian, or in emollient vehicles, with camphor, anodynes, &c. From one or two to four or five drachms of spirits of turpentine may be prescribed once or twice, or even oftener in some cases, in a suitable vehicle, if these fail; or this substance, or *assafrœtida*, or extract of rue, with some anodyne, may also be administered in mucilaginous enemata from time to time. In most cases of flatulent distension of the intestines, there is great disposition to ulceration of the aggregated mucous follicles—if, indeed, it has not already commenced; and both morbid conditions are greatly aggravated by the continuance of the flatulent state. The *intention*, therefore, is to procure the discharge of flatus, by means which may at the same time sheath and soothe the irritable mucous surface, and restore the lost tone of the capillaries of the diseased part; and, whatever operates in this way, will be productive of benefit. It is only by a judicious combination of agents, that this effect can be attained; and those just mentioned seem the most efficient, especially when the skin is cool, the pulse feeble, and the prostration extreme; and, in this state, the more energetic stimulants and tonics, or wine, or opium, may also be employed, according to the peculiarities of the case. (See § 155—159.)

555. *a.* The occurrence of *perforation of the intestines*, and consequent *peritonitis*, should not be overlooked in the enteric complication, or other severe forms of low nervous fever. Peritonitis seldom arises except from this cause, for large patches of the mucous surface, with Peyer's glands, may be destroyed by ulceration; and yet the peritoneum will be unchanged. When, however, diarrhoea has been suddenly arrested early in the disease, by an injudicious use of astringents, general peritonitis and effusion may result, without perforation, and even without ulceration. But this is only one of several bad consequences which may proceed from injudicious interference. If, in an advanced stage of fever, and after thirst, diarrhoea, tympanitis, and great prostration of strength, the patient suddenly complain of pain in some part of the abdomen, extending over it, with tenderness, increased distension, and rapid sinking of the powers of life, peritonitis has occurred. In this case, large doses of opium, to palliate the patient's sufferings, are the only means that can be used with any benefit. — Dr. Srooks, who has very ably elucidated the subject of peritonitis from this cause, and its treatment, directs one grain of opium to be given every hour, or two hours, until a decided effect is produced by it; and afterwards at longer intervals. (*Dublin Hosp. Rep.* vol. v.; and *Dublin Jour. of Med.* vol. i. p. 125.) When effusion of the intestinal contents into the peritoneal cavity occurs, the result must be fatal. But when adhesion of the peritoneum to the opposite surface takes place previously to the perforation, or when the perforation is speedily followed by a limited inflammation and effusion of lymph, recovery is possible. The formation of coagulable lymph can hardly, however, be expected in peritonitis occurring in the course of fever; as the states of vital action, and of the circulating fluids, are generally incapable of producing it.

556. *b.* *Treatment of putro-adynamic fever* (§ 484.).—The phenomena which especially characterise this variety, may appear either at an early stage of fever, or at an advanced period,—they may be the concomitants, or early consequences, of depressed vital energy, and imperfect powers of reaction; or the results of vascular reaction being so great, relatively to the state of vital influence, as to exhaust both the irritability of contractile parts, and the tone of the extreme vessels. In either case, alterations of the circulating fluids, and deficient vital cohesion of the soft solids, speedily follow, and coexist with these changes. In conformity with this view, with the pathological facts stated above (§ 529.), with a recognition of the characters of epidemics which have been observed in modern times in different countries, and with the results of personal observation, it may be safely inferred, that the treatment of this fever should mainly depend upon the state of vital action early in the stage of excitement, and the period of the disease in which the putro-adynamic signs appear; and that, in a practical point of view, it will be, therefore, advantageous to divide this variety of typhoid fever into—1st. The *consecutive putro-adynamic*, or that form which is contingent on more or less manifest reaction; and, 2d. The *primary putro-adynamic*, or that which is attended by imperfect, or no, reaction, and in which the characteristic pheno-

mena appear early in the disease. It should, however, be recollected, that both these forms may occur in the same epidemic, or that either may predominate; and, moreover, that the first or contingent state of putro-adynamia is sometimes met with in all epidemics, whether the fever be common synchoid, typhoid, or exanthematous, owing to the causes stated above, and with a frequency relative to the prevalence of these causes (§ 468.).

557. *a.* The *stages of premonition* and of *invasion* of this variety, are scarcely different in their characters from those announcing nervous or typhus fever. The same means as have been advised above (§ 540.) may, therefore, be resorted to, with the intention of preventing the further progress of disease, or of rendering it more mild.—When the symptoms of invasion are either indistinct or protracted, the consequent fever is often rendered much less dangerous than it otherwise might have been, by the adoption of the measures already detailed, and more particularly by exhibiting an energetic *emetic*, and by promoting its full operation by warm or tepid mucilaginous diluents. Tepid *sea water*, or a weak solution of common salt in a tepid state, has been employed with advantage, for the purpose either of promoting the action of the emetic, or of producing full vomiting, when there has been nausea or sickness.

558. *β.* In the *consecutive putro-adynamic*, or when the *stage of excitement* is more or less developed,—when the pulse is frequent, full, or sharp; the skin hot, and thirst considerable, or if an internal heat be felt; vascular depletion may be practised, but with due reference to the circumstances of the patient, and to the period which has elapsed from the time of invasion. So long as the characters of putro-adynamia have not appeared, these symptoms fully warrant a cautious recourse to depletion; and in young robust persons, even a repetition of it.—If rigors and shiverings are followed by inordinate or tumultuous reaction, the necessity of larger depletions is obvious. But, even in this case, they should not be carried too far, or to the extent of producing syncope; otherwise, in attempting to avoid the exhaustion consequent upon excessive action, a quantity of blood may be withdrawn, too great for the diminished power of tonic contraction possessed by the blood-vessels,—the vessels being incapable, owing to the loss of their tone, to accommodate themselves to, or contract sufficiently upon, their contents, when the reduction of these contents is great,—and thus collapse of vascular action, and of vital power, may follow.

559. *γ.* In the *primary putro-adynamic*, or in cases attended by indistinct signs of invasion, and by imperfect reaction, we can hardly venture upon depletion, unless indications of congestion or prominent affection of an important organ present themselves. In this instance, local depletions, or dry cupping, may be tried. If petechiæ appear early in these cases, or if the pulse be very compressible, very small, or broad and open; if the skin be cool, damp, or unnatural, yet not hot; if the tongue be flabby, or covered by a dirty mucous, although the fever is evidently not far advanced, or is very recently passed the stage of invasion; then bleeding should not be attempted. In this case, very different means must be em-

ployed; and with an energy proportionate to the prostration of strength attending these symptoms. If petechiæ, or vibices, or blotches, have appeared on the skin, they will furnish an additional indication, particularly if they assume a dun, or dark, or livid colour; and will indicate the propriety of having recourse to the tonics, stimulants, and antiseptics, and the combinations of them, about to be noticed.

560. 3. In *either form* of this fever—in the *first*, after depletions, in the *second*, after the operation of an *emetic*, which should be given at any time during the invasion, or for three or four days afterwards—the bowels ought to be freely evacuated, by either of the mild *purgatives* mentioned above, and by the occasional use of laxative enemata; and frequent but small doses of *nitre* may be afterwards exhibited in the saline medicine already prescribed, or of the *muriate of ammonia*, in camphor mixture, or any other suitable vehicle. These latter are more especially indicated, if any heat is felt in the region of the stomach, and if the tongue is red at its edges and point. If there be increased heat of skin, tepid sponging the surface with the weak nitro-muriatic solution, or with a mixture of pyroligneous acetic acid, rose water, and camphor mixture, will prove both grateful and beneficial.—It is seldom, even in the primary putro-adyndamic, that *tonics* are productive of much benefit very early in the disease. But, when exhibited with *refrigerants*, they are often of great service. The infusion or the decoction of cinchona, either with the solution of the acetate of ammonia, and nitrate of potash, or with the muriate of ammonia, a few drops of muriatic acid, and sometimes also with muriatic ether, is the kind of tonic which I can recommend from experience, as being the most suitable to an early stage of adynamic fever.

561. It is in this variety of typhoid fever, more especially, that the question as to the superior efficacy of alkaline medicines and of the non-purgative salines, or of mineral and vegetable acids, becomes a matter of extreme importance. Of the latter I can speak from observation; of the former I have not yet made sufficient trial to enable me to form a satisfactory opinion. It were to be desired that Dr. STEVENS, who has so strongly advocated the use of alkaline and saline substances in this fever, would furnish us with that sort of evidence of their efficacy, which would justify an early and decided recourse to them; and that those, who have ample means furnished them of settling the question at issue, would at last put it beyond the reach of cavil. That these substances are beneficial, at least several of them, is fully shown by the experience of successive ages and of numerous writers. This is the case in respect of nitre, muriate of ammonia, and chlorate of potash, of the excellent effects of which I am convinced by repeated observation. But the superiority of alkaline subcarbonates over acids, has not yet been proved. It is also doubtful, whether or not the benefit found to result from the former has not chiefly proceeded from the medicines with which they have been combined. At present we are guided in some measure by what we know of the physiological action of these substances. The fixed alkaline carbonates redden the blood when carried into it; but they relax the tone of the digestive

mucous surface. Nitre produces a similar change in the blood, and resists any tendency to decomposition. Acids constringe the mucous and contractile tissues, impart firmness to the coagulum, but render the blood more dark than natural. With these imperfect data, the experience derived from accurate observation ought to be our chief guide: and whether we adopt acids in the earlier stages of the disease, and alkalies subsequently, or reverse this order, or even prescribe, in conjunction with neutral salts, either an acid, or an alkali in excess, much difficulty will be felt in ascertaining how much is due to either of these means, and what may be legitimately imputed to other remedies, with which we may be morally bound to combine them, in order to render their beneficial operation more certain. When certain remedies, which have been particularly recommended in this form of fever, come under review, these substances will receive further attention.

562. In various states of putro-adyndamic fever, *external derivatives* will be required; as in the other varieties. When bloodletting is necessary at the commencement, they should follow this operation, particularly when prominent affection of an important organ exists. As to the choice of derivatives, little need be added to what has been already advanced. If blisters be adopted, attention is sometimes required to prevent spreading or sphacelating sores. They should, therefore, be applied only until they cause redness of the surface; when they may be followed by a warm poultice. Equal care is necessary to prevent sphacelation of the parts pressed upon in bed, and the occurrence of foul sores, from the contact of the morbid excretions, or from both causes conjoined. The means likely to counteract or remedy this occurrence have been stated above (§ 166.).

563. 4. In the *modifications* of this fever, noticed above (§ 488.), a decided recourse to the same medicines as are necessary in the advanced stages of the regular form, must be had, more particularly when signs of colligation are early and prominent. The intention in this case is to arrest the progress of the changes of the blood, by supporting the powers of life, and promoting the functions of excretion. If it should be found possible to correct, in a more direct manner, the state of the circulating fluids, this indication ought also to be adopted, and the means which operate in this way resorted to. In conformity with the former indication, full vomiting should be induced, if it have not already taken place, and a mild stomachic purgative afterwards given. This latter ought to be repeated, according to the state of the bowels, and the appearance of the evacuations, which will furnish indications for the employment also of enemata, and indicate such as are most appropriate. In the worst forms of erysipelas, and in diffusive inflammation of cellular structures, I have found equal parts of the decoction of cinchona, and the compound infusion of senna, with tartrate of potash, subcarbonate of soda, and compound tincture of cardamoms, an excellent purgative, and I see no reason against its use in this state of adynamic fever. After the bowels have been freely evacuated, decoction of cinchona, or a strong infusion of valerian, with chlorate of potash, and chloric ether, may be prescribed, according to the severity of the disease. Of the good effects of the decoction

tion of cinchona with the compound tincture, nitrate of potash, and subcarbonate of soda, I can also speak from experience. When the prostration of strength is extreme, a pill containing two or three grains of camphor should be taken with each dose of either of these, at short intervals.

564. Other tonics, and different combinations of them from these now mentioned, will frequently be productive of great benefit, when morbid excretions have been evacuated. However specious the arguments adduced by some writers against the employment of *acids* in the putro-adyamic states of fever, it cannot be denied that good effects have been produced by them, especially when exhibited with powerful tonics. The infusion or decoction of cinchona, with muriatic acid, or with nitro-muriatic acids, and chloric ether (formerly Clutton's febrifuge); the sulphate of quinine with sulphuric acid, and HOFFMANN'S anodyne; and pyriligneous acid in large doses, with camphor, the solution of the acetate of ammonia, and tonic or aromatic infusions, or the infusion of serpentaria or of arnica, are the most energetic, and may severally be tried, according to the peculiarities of the case. A solution of camphor in acetic acid was a favourite medicine with many writers on putro-adyamic fever, and was employed by them both internally and externally.

565. Dr. STEVENS'S saline treatment is most appropriate in this form of fever. He directs twenty grains of the muriate of soda, thirty grains of the subcarbonate of soda, and eight of the chlorate of potash, to be given every two or three hours—or more or less frequently, according to the urgency of the case—dissolved in water, in the advanced stages. He believes that, when these salts are prescribed before the stomach has ceased to perform its functions, they will not irritate the alimentary canal, but will be absorbed into the circulation, and correct its morbid state. One or two table-spoonfuls of common salt may also be administered occasionally in a tepid gruel enema. The strength should, at the same time, be supported by strong beef tea, or the regimen about to be recommended.

566. *ζ.* If putro-adyamic fever be attended by *predominant affection* of any organ, local depletions, followed by external derivatives, will be necessary, particularly in an early stage of the fever.—At a later period, external derivation, and the other means advised for the complications of nervous fever, according to their seat, should be employed. In this variety, however, a more liberal use of tonics, conjoined with the antiseptics just mentioned, is generally required.—When this or any other form of typhoid fever is complicated with *asthenic inflammation of the fauces or pharynx*, or both, the means already recommended are quite appropriate. In these cases, deglutition is very difficult, and sometimes impossible. Recourse to external derivatives, and to injections, is then urgently required. The action of the bowels should also be solicited by purgative enemata, unless diarrhoea exist; and the medicines that are indicated should be administered in clysters, and in sufficiently large doses. As the patient is generally unable to gargle his throat, advantage will sometimes accrue from syringing it with any of the tonic mixtures above prescribed, or with a solution of the chloruret of lime or of kreosote; and if a part, or the whole, or either

of these, should be swallowed, the more benefit will be derived.

567. *η.* If this variety become complicated with *diarrhoea*, disorganisation of the digestive mucous follicles and surface will rapidly take place, if the treatment be not prompt and judicious. The means already advised (§ 546. 447.) for this complication must be adopted in this case. If the diarrhoea occurs at an early period, it will generally be moderated by tonic infusions, with the nitrate of potash, or with the muriate of ammonia, and the compound tincture of camphor. A combination of ipecacuanha, nitre, camphor, and opium, or extract of poppy, will also often diminish or remove it. If *hæmorrhage* supervene from the bowels, these medicines will sometimes be sufficient to remove it. In more urgent cases, the energetic remedies previously directed (§ 547.), or the pyriligneous acetic acid, with camphor and kreosote, or turpentine, &c., should be prescribed by the mouth, and in enemata. When diarrhoea or hæmorrhage characterises putro-adyamic fever, the alkaline subcarbonates will frequently aggravate or perpetuate it, and render convalescence protracted. In other respects, the treatment directed for the complications of nervous fever, and for its last stages, is also suitable to this; these stages requiring either the measures just described, or several of those about to be noticed, with a more or less direct reference to the putro-adyamic state, or various combinations of the substances already enumerated (§ 548–555.).

568. *c. Treatment of Exanthematous Typhus* (§ 497.).—The *premonitory* and *incubating periods* of this fever should be treated as recommended above (§ 540.), with the view of arresting or rendering more mild the procession of morbid phenomena.—*a.* In the *stage of reaction*, the indications are—(a) to moderate excessive excitement; (b) to guard important organs from the effects of prominent action.—If full vomiting has not occurred previously, it should be excited by an emetic, at the commencement of this stage, or on the first, second, or third, day of it. If, however, inflammatory signs have become evident, particularly if the lungs are affected, a moderate *bloodletting* should precede the emetic. The eruption, which generally appears in this period, is usually followed by slight alleviation of the symptoms, and should therefore be promoted by mild, tepid diluents, which may be made either diaphoretic, mucilaginous, or acidulous, according to circumstances. As to *bloodletting* in this disease, it is pernicious in many, if not in most cases; and not merely in the nervous, but even in this stage. In the mild and regular typhus, it is superfluous: but when a highly inflammatory character marks this period, or when local action becomes very prominent or excessive, it must not be omitted; otherwise the local affection may run into disorganisation, and the nervous stage will be rendered more protracted or dangerous. The amount, repetition, and mode of depletion, will depend upon the peculiarities of the case.—When the bowels are open in this stage, *purgatives*, unless of the mildest kind, are unnecessary. Severe purging is prejudicial, as it derives from the skin, interrupts the regular course of the disease, and risks the production of the enteric complication. Tonics and stimulants are also injurious.

569. *β*. In the *nervous stage*, the disease has induced a state of exhaustion; and the system requires to be supported, and even gently excited. HILDENBRAND recommends an *emetic* early in this period, if it have not been given previously; and *blisters* to be applied, about the seventh or eighth day, when the nervous stage commences. *Camphor*, with the solution of the *acetate of ammonia* and *nitre*, forms one of the best medicines that can now be exhibited. The quantity of camphor, however, should not at first exceed one grain every two hours, or a grain and a half every three hours. — *Arnica* was one of the medicines most commonly employed in Germany during the prevalence of this fever in that country, early in the present century. HILDENBRAND states, that its operation is stimulant, alterative, and, in large doses, emetic; and that it does not promote, but rather prevents, diarrhoea. In typhus, it lessens the stupor, giddiness, and delirium, and increases the cutaneous transpiration; but it is useful only when the inflammatory character is quite gone. It should be given in the form of infusion, in a quantity short of producing nausea. This most able and experienced writer advises also, in the course of this stage, the use of volatile stimulants, especially the infusions of the roots of *angelica* and *imperatoria*, and of the flowers of the *calamus aromaticus*.

570. In the typhus epidemic, in the military hospitals in Vienna and surrounding countries, during the late war, where it was impossible to prescribe for the cases individually, the following plan was pursued by HILDENBRAND, with great success, in the simple and regular disease: — On the first day of the fever, an emetic was administered, and succeeded by diluent diaphoretic decoctions. About the seventh day, when the typhomania and debility were increased, the skin and tongue dry, and the belly distended, blisters were put on the calves of the legs, and eight ounces of an infusion of two drachms of the flowers of *arnica*, and as much *angelica* root, with a little of HOFFMANN'S anodyne, were given daily, two table-spoonfuls being taken every two hours, alternately with camphor powders. — Stimulants, in this fever, should be prescribed in frequent but small doses, rather than in large quantities. Cinchona and other tonics are superfluous as long as the disease is mild and regular. But they, together with wine, &c., are required, if the putrid-anæmic state appears in this stage.

571. *γ*. If the preceding stages have been prudently treated, and if the disease has been regular and mild, nothing more is necessary in the way of medicine, as the *period of crisis* approaches, than to promote the evacuations attending it; and, as the chief of these is perspiration, mild diluents, and the diaphoretics in common use, or those just mentioned, are to be continued. All medicines should not be abandoned immediately after a crisis. Stimulants, however, should be milder, and given at longer intervals. HILDENBRAND advises the camphor and *arnica* to be given up, and the infusion of *angelica* to be continued for some time. As *convalescence* advances, the treatment should be chiefly dietetic and regimènal.

572. *δ*. Their *irregular forms of typhus* — the modifications and complications — require appropriate means, or variations of the procedure now recommended. — If the *inflammatory character* is violent,

a more active antiphlogistic treatment is necessary. But the existence of deficient power, and the knowledge that the nervous stage must follow, should influence the practitioner. For an inflammatory state of the brain, or the semi-apoplectic state, bleeding generally and locally must be adopted, to an amount which the circumstances of the case will suggest. When the lungs are affected, this practice, aided by antimonials, blisters, and diaphoretics, is equally necessary. If the inflammatory state be not entirely removed, and if it is not safe to bleed more, or if this state be prolonged into the nervous stage, external derivatives and antimonials are to be chiefly confided in. The same practice is applicable to the association of *hepatic disease* in this stage. The affection of the intestinal mucous surface requires the same treatment as was recommended in synchoid and nervous fevers (§ 546. *et seq.*) — Sometimes the *gastric or bilious* character predominates, particularly in summer and autumn, owing to impurities in the *prima via*, and accumulations of bile in the hepatic ducts and gall-bladder. Emetics are necessary in these cases especially, unless there are indications which forbid them; and mild purgatives, in the inflammatory stage — in the nervous, aperient clysters — should be preferred.

573. *ε*. In the nervous stage various irregularities often occur. If this character is excessive, or has taken place suddenly, large and repeated doses of volatile stimulants are necessary. Camphor, ammonia, ether, musk, cinchona, serpentaria, wine, opium, and blisters, are severally useful, when judiciously combined. Phosphorus has been recommended for this state, but HILDENBRAND found it useless. During this stage, a passive, asthenic, or nervous, kind of inflammatory action may occur, particularly in the mucous surface of the intestines and in the mucous follicles; but it sometimes also affects the brain and lungs. When it attacks the *intestines*, there is a painful feeling excited by pressing the abdomen; the pulse is small and irregular or unequal; the belly is tympanitic or tense; and the stools very frequent and morbid. For this state, a moderate or small local depletion; blisters, sinapisms, or hot turpentine embrocations, followed by warm poultices, over the abdomen; camphor, with hydrargyrum cum creta, and DOVEN'S powder, in large quantities of mucilage; or camphor with ipecacuanha, nitre, and opium; mucilaginous enemata, with extract of poppies, &c.; and the other means already mentioned (§ 547.); should be chiefly relied upon. If this form of inflammation, or of inflammatory congestion, attack the *liver*, tenderness and fulness in the right hypochondrium, and jaundice, generally accompany it, and a very dangerous complication results. Local depletion is sometimes of use, but as frequently it is of little service. Mercurials, excepting, perhaps, the hydrargyrum cum creta, are still less efficacious. Blisters over the hypochondrium and epigastrium; frictions with rubefacient liniments in this situation; rubefacient applications on the insides of the thighs; emollient and aperient enemata, if the bowels require to be assisted; camphor, with nitre, or sulphate of potash, and anodynes; diuretics conjoined with mild diaphoretics; and the nitro-muriatic acid given internally with the spirits of nitric ether, or used externally as a lotion or wash; may severally be productive of benefit.

574. *z.* The nervous inflammation of the brain is indicated by sopor and profound typhomania, and should be combated by blisters on the head; by camphor, by arnica, and the means directed for this affection in nervous fever (§ 548.). If tightness of the chest and dyspnoea occur in the nervous stage, congestion of the weakened vessels of the lungs may be inferred. In this state, a small bleeding, to the amount of four or six ounces, may be directed in some cases, and followed in all by blisters on the chest, and antimonials conjoined with camphor.

575. *n.* If the *putro-adyamic character* supervenes and predominates as the nervous stage proceeds, the debility, equally with the morbid state of the blood, requires attention. The preparations of cinchona, either with mineral acid, or with alterative neutral salts, large doses of camphor, wine, opium, and the other means directed for the various phases and complications of this condition, will be required according to the peculiarities of individual cases. If *diarrhoea* or *dysentery* comes on in this state, opium in large doses, but at distant intervals; warm dilute wine, with spices and other aromatics; mucilaginous and farinaceous liquids, or gruel, with common salt, taken in small quantities but often, and administered in enemata, with syrup or extract of poppies; and the other remedies noticed above (§ 553.); should be prescribed. — If *singultus* or *meteorismus* occur, they should be treated conformably with the principles already explained (§ 554.). — Swellings of the parotids are unpleasant accidents, even when critical. They should be checked at first by keeping the bowels moderately open, and cold applications to them. If this end be not accomplished, then suppuration should be promoted by stimulating poultices; and the abscess should be early opened, in order to prevent contamination of the surrounding cellular parts. If gangrenous sores appear in any part, the means directed above (§ 166.), more particularly the chlorides, kreosote, powdered bark, turpentine, &c., either severally, or variously combined, or in the form of wash, epithem, or poultice, ought to be promptly and assiduously employed.

576. *iii.* *Of certain Medicines, &c. in Typhoid Fevers.* — *a.* *Antimonials*, especially JAMES'S powder and tartar emetic, are frequently of service in the early stages of fever: the latter for its emetic operation, and its febrifuge or contra-stimulant action during excitement; and the former for this last effect, in connection with its diaphoretic influence. The remarks already offered respecting these medicines (§ 162.) are applicable to the use of them in the fevers under consideration. It is chiefly in the early periods, in the more inflammatory states, in the pulmonary complications, and either in aid of, or as substitutes for, bloodletting, that they should be employed, more particularly tartarised antimony. However, the results of RAZORI'S practice, and the recent trials made of this medicine by Dr. GRAVES, in the advanced stage of typhus, indicate the propriety of having recourse to it, at a later period, in much more liberal doses than have been hitherto considered safe. This able physician, reasoning from the good effects of the medicine in delirium tremens, was induced to resort to it in a case presenting a quick, falling pulse; a black, dry, tremulous tongue; tympanitis; low, muttering deli-

rium; startings of the tendons, and nervous agitation. He prescribed four grains of tartar emetic, in eight ounces of camphor julap, with a drachm of tincture of opium—a table-spoonful to be taken every second hour. The patient vomited after the second dose; and, after the fourth, he fell into a calm sleep, and soon recovered. Besides the good effect of this medicine, that of vomiting at this stage of fever, as recommended by many of the older writers, is shown by this case. Dr. GRAVES refers to other instances (*Lond. Med. and Surg. Journ.* vol. vii. p. 541.), in which tartar emetic and opium produced decided benefit, in most unfavourable states of the advanced periods of low nervous fever, and of exanthematic typhus. The combination of tartarised antimony with nitre is most appropriate in the stage of excitement; but, in the nervous stage, opium seems indispensable to the good effects of the antimony.

577. *b.* *Of other antiphlogistic and contra-stimulant means*, it is unnecessary to add any thing to what has been already advanced. The contradictory opinions entertained as to the propriety, or amount, of depletion are readily explained, when the various forms of typhoid fever, and circumstances of the case, are taken into consideration, in connection with the intentions with which bloodletting on the one hand, and restoratives on the other, are resorted to; and with the fact that both are very frequently required, not only consecutively but even simultaneously. This circumstance was well known to very many of the numerous writers on these fevers during the three last centuries, both in this and in foreign countries. They well knew and strenuously inculcated the fact, even as late as the days of CLARKE, that, in order to prevent the accession of the putro-adyamic state, it is necessary to bleed, and to use other antiphlogistic remedies, with decision, early in various fevers and epidemics. And next to bleeding, *nitre* and the *muriate of ammonia* were held in estimation, for their effects in lowering morbid reaction at the commencement of typhoid fevers, and in preventing putridity in advanced stages. Thus, whilst *nitre* was conjoined with antimonials, ipecacuanha, small doses of camphor, or with the spirits of nitric ether, to fulfil the former intention, and to promote perspiration and the action of the kidneys, it was given with tonics and stimulants, to produce the latter indication. The writings of DELIUS, HILLARY, HAFNEL, WOOD, RAZORI, and many others, show us how very little we have hitherto improved upon their practice in these fevers. The same remark applies to the use of the *muriate of ammonia*, whose operation as a refrigerant, antiseptic, and tonic ranks it as one of the best and most generally applicable of the many remedies employed in fever.

578. *c.* As to the use of *alvine evacuations*, we have arrived at similar conclusions to those very generally acted upon during the seventeenth and eighteenth centuries, but partially lost sight of towards the close of the latter. — The good effects of *emetics* at the commencement of typhoid fevers were almost universally admitted, until BROUSSAIS banished them from his code of therapeutics. — That circumstances sometimes sometimes occur, which either render them unnecessary, or even forbid them altogether, has been allowed; but

very sufficient evidence has been adduced of their good effects, more particularly in the periods of premonition and invasion, and even early in that of excitement. Many writers of great experience, especially CHEYNE, TUOMY, STOLL, SANDIFORD, REIL, HILDENBRAND, HUFELAND, &c., have advised them in the advanced stages of these fevers; and, although they are rarely employed in these periods by practitioners in this country, I believe that they will often prove of service even then, when judiciously resorted to, in exanthematic typhus. The injurious effects imputed to them by MARCUS, WENDELSTADT, BROUSSAIS, and others, are to be referred to the employment of them in the gastric complication, and in other circumstances which contra-indicate their use.

579. The operation of *purgatives* in low fevers is now well understood; the indiscriminate use of them encouraged by the writings of HAMILTON having been checked and tempered by the partial adoption of the views of BROUSSAIS. And yet I believe that the particular state of the intestinal mucous surface that exists in these fevers may be increased by a neglect of this class of medicines; and that, when appropriately combined, many of them are calculated to prevent, or to alleviate, the morbid condition which the disciples of BROUSSAIS imagine them to produce.—A tolerably active purgative early in excitement, or in the other circumstances above noticed, both lowers excessive action, and removes morbid excretions, which, if allowed to remain, would prove a cause of irritation and contamination to the frame. In cases, however, where the vascular excitement is attended by vital prostration, either early or late in the disease, the use of purgatives requires much caution. When excitement is considerable, *calomel* with *jalap*, or with *rhubarb*, will be given at first with advantage; but, in other circumstances, the *calomel* should be withheld. When, with excitement, there is considerable pulmonary affection, the tartar of antimony may be added to the purgative adopted, as advised by Dr. MCCORMAC, and indeed very generally adopted in practice. But when vital depression is the predominant feature of the disease, we should be as cautious in the use of purgatives, as in having recourse to bleeding. The evacuation of the serous portion of the blood by means of the former, is nearly equally depressing with the latter operation. In the advanced stages, and especially when putro-adyamic signs begin to appear, the blood-vessels, owing to the loss of a great portion of their tonic contractility, cannot accommodate themselves to the evacuation of much of their contents, in whatever way it may be effected; for the column of blood in the vessels is no longer presented to the contraction of the ventricles in that state of tension, which favours its healthy circulation. If the bowels, however, require the aid of a purgative, during a state of prostration, it ought not to be withheld; but it should be so selected, as to produce no greater evacuation than may appear requisite, and be so combined as to leave a tonic or salutary impression upon the digestive mucous surface. In such cases, equal parts of the compound infusions of gentian and senna, or an infusion of cinchona and *rhubarb*, or the compound decoction of aloes, or *rhubarb* and subcarbonate of soda, or the purgatives already mentioned (§ 150,

151.), or some of those prescribed in the *Appendix* (F. 180, 181, 205, 216, 252, 433.), may be resorted to. In the putro-adyamic form, and in the advanced states of typhoid fever, purgatives ought to be always combined with tonics, and aromatics. They should never be given, excepting very manifestly required; and then in moderate doses, and combined as now advised, particularly when there is diarrhoea, or evacuations of blood, or meteorismus. However, *rhubarb*, or turpentine, in small or moderate doses, with aromatics, will often be of much service in such cases.

580. *d.* There are several *stimulants* of great use in low fevers; and which, owing to their peculiar or febrifuge operation, may be given with great benefit, in that state of excitement, which is attended by vital prostration, as well as in more advanced stages of the disease. Of these the most applicable and beneficial is *camphor*. This substance is most generally adopted; and has received the encomiums of most writers on typhoid fevers, and more particularly of RIVERNUS, STOLL, FERRO, HOMF, MARCUS, THOMANN, GEBEL, REIL, SCHLEGEL, HORN, and HILDENBRAND. I have prescribed it not only in these, but also in pestilential, exanthematic, puerperal, and common continued fevers; and am satisfied as to its good effects, either when exhibited alone, or when combined with other appropriate medicines, and given in proper doses. In the *stage of excitement*, the dose, and the medicines which should be associated with it, should have reference to the state of vital power, to the mildness or severity of the disease, and to the nature of the prominent affection or complication. In this stage, particularly if vital power is not much lowered, it may be given in frequent doses of half a grain, or a grain, with a weak solution of the acetate of ammonia, or in a mixture with it and spirits of nitric ether, or with nitre (F. 494, 496.), or with muriate of ammonia (F. 431.), or with antimonials (F. 493.), or with any two or more of these. It may be also exhibited, in some circumstances with advantage, conjoined with *calomel*. If vital power is much depressed in this stage, the dose of the *camphor* may be increased, and the antimonial or the *calomel* omitted, or given merely at the outset. In some one or other of these combinations, it will prove of benefit, whatever complications the fever may present. As the disease passes into the *nervous stage*, and, more especially, as this stage passes into extreme exhaustion, the dose of *camphor* should be increased, and it may then be conjoined with tonics, various stimulants, antiseptics, &c., as *arnica*, *cinchona*, *serpentaria*, *valerian*, *angelica*, *opium*, *sulphate of quinine*, the *chlorides*, *musk*, *aromatics*, &c., according to the period and peculiarities of the disease. Many of the best writers in Germany prescribe it, early in the *nervous stage*, with *arnica*, or with *acetic* or *citric acid*. HAUTE-SIERK, CALLISEN, LUDWIG, BONNEVAULT, FRANK, JAEGERSCMIDT, and HUFELAND direct a solution of *camphor* in *acetic acid* to be taken internally, and used externally, early in most states of typhoid fever. With the pyrolineous *acetic acid*, the *camphor* may be conjoined with still greater benefit. The inflammatory state of any organ supervening in the course of typhoid fevers does not contra-indicate the use of *camphor*, if given appropriately to the degree of vascular action and of vital power.

581. *Arnica* has been very much employed in Germany in low fevers, and in the nervous stage of typhus, yet it has not received a satisfactory trial in England nor in France. STOLL, FISCHER, COLLIN, FERRO, MERCIER, FRANK, RICHTER, HECKER, HILDENBRAND, and other high authorities recommend it, generally as directed above (§ 569.). QUENTIN prescribes an infusion of it with valerian. The flowers and the root are most commonly employed, and usually in the form of a weak infusion (F. 222, 223.).

582. In the low nervous form of typhoid fever, as well as in the nervous stage of exanthematic typhus, or in that stage and state of the disease for which the German physicians prescribe *arnica*, *valerian* may be employed with advantage. MATTHEI, FRIZE, REIL, THOMANN, and others recommend it. I have given an infusion of it in several cases, and made it the vehicle of other medicines, particularly the chlorate of potash, camphor, the alkaline subcarbonates, *serpentaria* (F. 269, 270.), &c. It is indicated in such states of fever as require a gentle tonic and stimulant of the nervous influence, especially when the nervous symptoms are prominent, although the head be cool, and the pulse weak. In these circumstances it may be conjoined with camphor, tonics, &c.

583. *Serpentaria root* was praised by FRIZE, STOLL, REIL, MARCUS, and others, in the advanced stage of low fevers, and in the circumstances just mentioned. It is still used, when the skin is cool or the pulse is weak, and when warm stimulating tonics are required. It is most serviceable in the form of infusion, with aromatics and tonics (F. 262. 416. 826.). *Angelica root* was recommended by REIL; *imperatoria root*, by HOFFMANN; and the root of *calamus aromaticus* by HILDENBRAND. They are very rarely employed in this country, although they are of service, particularly in the form of infusion, as vehicles for other medicines, and on account of their warm, diaphoretic, and stimulant effects. They may be employed variously combined with each other, or with camphor, tonics, &c.; and are indicated in the same circumstances as require the use of *arnica*, viz. in the low nervous and putro-adyynamic states. Their infusions are good vehicles for tonics, the chlorates, or alternative salts. I have sometimes prescribed them with chloric acid and chloric ether, or with the chlorides of soda and potash.

584. *c. Cinchona and other tonics* have been praised by HUXHAM, LIND, LANGRISH, GRANT, WESTPHAL, SIMS, VALLISNERI, CASSON, FORDYCE, and most of the writers on fever during the last century, and by many contemporary authors; whilst others have attributed more or less mischief to their use. When the various forms of typhoid fevers, their complications, and the very different pathological states in the successive stages of their course, are considered, this contrariety of opinion is easily explained. When the nervous stage has appeared, and when the putro-adydynamic state is pronounced, whether early in the disease, as in the putrid or septic variety, or in the advanced stages of the nervous and exanthematous, the preparations of *cinchona*, and the *sulphate of quinine*, are the best tonics that can be selected, both for the permanence of their action, and for their influence in arresting the disposition to colliquation that pervades the fluids and soft solids

of the frame. In the early states of the disease, and where the propriety of having recourse to tonics is a matter of doubt, the infusion of bark, with the solution of the acetate of ammonia, and spirits of nitric ether, or the decoction of *cinchona*, with nitre and muriate of ammonia (F. 437, 438.), will generally prove serviceable.

585. *f. The propriety of having recourse to acids* in the states of low fever just alluded to has recently been disputed; and if the effects produced by them on the blood be considered, as shown by the experiments of FRIEND, ELLER, GIANELLA, HALLER, &c., and as stated in the article BLOOD (§ 135. 136.), rational doubts of their salutary influence may be entertained: yet the experience of most writers is in favour of them, particularly in fevers of a low character. SPANGENBERG, HUXHAM, LANGRISH, WOOD, MURSHIN, ROWLEY, BOYER, RADEMACHER, SCHLEGEL, HORN, FORDYCE, BANG, MILLAR, FRANK, HUFELAND, &c. recommend the mineral acids, especially the *muratic*, in the circumstances mentioned above. From a careful observation of their effects in many cases, I believe that they will prove beneficial in some cases, and injurious in others, according to the period and state of fever, and the mode of prescribing them. If they are given before the blood has become materially altered, and the vital energy much exhausted, but after requisite vascular or alvine evacuations have been carried sufficiently far—whilst the skin is still warmer than natural, and whilst the pulse is broad, open, and compressible, the mineral acids, with tonic infusions, will generally be serviceable. In this state, the infusion or decoction of *cinchona* may be given with *muratic acid* and *chloric ether*; or the sulphate of quinine, with infusion of roses and sulphuric acid, or also with sulphuric ether. When the prostration is considerable, this latter may be the more energetic medicine. In more doubtful cases, particularly when the heat of surface is great, the infusion of *cinchona* or of *valerian* may be given with the nitrate of potash, or with the *nitrate of soda*, a few drops of nitric acid, and the spirits of nitric ether; and when the skin is cooler, either of these infusions, or some one of the others already mentioned, may be prescribed with equal parts of the *nitro-muratic acid* and the tincture of *serpentaria*.

586. In the treatment of typhoid fevers it should never be forgotten that the state of the circulating fluids depends chiefly, if not entirely, upon that of the organic nervous influence, and that agents which apparently deteriorate the blood may yet be of use by administering to this influence. The *carbonic acid gas* was supposed by JANSSEN, FONTIER, and PERCIVAL, to act as an energetic tonic, when taken into the digestive canal; and they, therefore, directed the use of those fluids which contain it most abundantly; and even advised it to be thrown up the rectum. A similar practice was lately recommended by Dr. CLANNY, with the view of supplying the blood with this substance. But M. CHOMEL has shown the inefficacy of the practice (§ 538.). The acids which have appeared to me most serviceable in the early period of the adynamic, nervous, or putro-adydynamic forms, are the *muratic*, and the *pyroligneous acetic*, particularly when given in the decoction of bark (F. 388.), or in either of the warm stimulant infusions mentioned above.

When the nervous or putro-dynamic states are far advanced; when the temperature is low, and the skin lurid or discoloured; I believe, that whatever benefit follows the use of mineral acids, depends chiefly upon the salutary efforts of nature, or the substances prescribed at the same time. In the state just mentioned, the more energetic tonics and stimulants, in conjunction with camphor, the chlorate of potash, opium, wine, &c., are much more deserving of confidence. Besides cinchona and sulphate of quinine, other tonics, as cascarrilla, calumba, gentian, &c., may be used; but they are inferior to bark; and ought to be given chiefly in conjunction with substances appropriate to the peculiarities of the case. The *willow bark* has been recommended by OTTO, SCHIÖGEL, WHITE, and HUFELAND, but it does not appear to be equal to cinchona.

587. *g. The chlorates, &c.* — The *chloride of potassium* (muriate of potash) was first employed, under the name of digestive salt, by SYLVIVS; and, owing to its febrifuge properties, it afterwards obtained the appellation of febrifuge salt of SYLVIVS. It was given in doses of from one to two or three drachms: and, although its action is stimulant, aperient, diuretic, and anti-septic, it has seldom been used in modern times. It is of service in the low stages of fever, and when there is evident change in the circulating and secreted fluids; but it is inferior to the *chlorate of potassa* in these states. This latter salt was recommended by GARNETT and some other writers, but at no time has it been generally used. I have prescribed the chlorate of potash in several diseases, since 1819, and consider it a valuable medicine, especially in the advanced stages of typhoid fevers. When excitement or vascular reaction is about to pass into the nervous stage, and when inflammatory determination has been removed, either of these salts, but the latter especially, will be prescribed with benefit. The chlorate may be advantageously conjoined with tonics, and camphor; or it may be given in doses of five or seven grains every two or three hours, in tonic infusions, or in larger quantities at longer intervals. — A solution of *chlorine*, or of *chloric ether*, or of both, may be used in the same states, for which the chlorate of potash or the chlorides are here recommended.

588. The *chloride of sodium*, or common salt, although sometimes used, in various forms, but commonly as an aperient and anthelmintic, by the older writers, has recently been seldom resorted to, excepting in enemata, in the treatment of low fevers. Formerly putridity was much insisted upon as a characteristic of certain states of fever; for, owing to the intensity and concurrence of the exciting causes, to the treatment, and to the influences in operation through the course of the disease, these changes of the fluids and soft solids, which, although not strictly putrid, yet somewhat resemble it, or even approach it, were common occurrences, in the course of the inflammatory, as well as of the adynamic varieties. These changes, inasmuch as they consist, in some measure, of an incipient dissolution of the vital cohesion of the tissues, and of the healthy condition of the fluids, quickly passing, with the disappearance of life, into manifest decomposition, were not altogether inappropriately termed putrid; and, for want of a more suitable

name, they may still retain the denomination. With the modern disuse of this term, and from a disbelief of the possibility of putridity taking place in a living body, the operation of medicines in preventing or counteracting it was denied. Thus an *antiseptic* property was denied to medicines, although it could not be doubted that many substances had the power both of averting and of remedying the changes usually termed putrid. This power was imputed to their influence upon the nervous system, particularly the cerebro-spinal part of it. I have, however, shown at other places, by experiments performed by myself and others, that numerous substances are quickly conveyed into the circulation, where they directly change the state of the circulating fluids and secretions, and affect the organic or ganglionic nervous influence.

589. Conformably with this view, the older opinion as to the operation of antiseptics on the living, as well on the dead body, — that certain substances prevent or counteract the changes usually denominated putrid or septic, — seems well founded. There can be no doubt that the circulating fluids are contaminated or altered in the course of fever, owing to the *superabundance* of certain constituents, and the *loss* of others necessary to the continuance of health. The impeded functions of the lungs, the skin, liver, and kidneys, in the early stage of the disease, will occasion the former of these changes; and the stop put to the functions of digestion and assimilation — to the sources of supply — will produce the latter. That the muriate of soda is necessary to the healthy state of the blood, cannot be doubted; it therefore follows that the privation of it, for a number of days, during the treatment of fevers, will materially favour the morbid condition which the fluids assume in the advanced stages. But as other substances, as the muriate of potash, muriate of ammonia, nitrate of potash, and nitrate of soda, act on the blood and on the economy in a similar manner to the muriate of soda, although not so beneficially, universally, and permanently as this last, which has been so bountifully supplied by nature, we are enabled to account for the benefit derived from the use of them, in the advanced stages of fever, by writers in the sixteenth and seventeenth centuries. It seems very probable, that the common salt taken so abundantly with our food, after having produced the effects arising from its neutral state, is decomposed by the nervous or vital influence, or by the electricities circulating through the frame; and that each of its constituents performs ulterior offices in the economy, that are necessary to the continuance of health, and enters into new combinations, produced by the actions of the respective organs, in the circulating and secreted fluids.

590. If this view be just, the insufficient supply, or the privation, of this salt in the early stages, whilst the discharge of it continues by the excretions, in either its neutral or its decomposed states, will cause a deficiency of it in the blood in the advanced periods of fever, and will give rise to further changes both in the circulating and in the secreted fluids. In conformity with this opinion, a modification of the medical and regimenal treatment, usually recommended in typhoid fevers, should be adopted. It is not improbable, that the evils resulting from a total privation of a substance so necessary to the

healthy discharge of the functions, as the muriate of soda is, would have been more generally manifest in these diseases, if other substances, acting somewhat similarly upon the blood and on the system, had not been commonly employed in the treatment of them. I have been led, by the antiseptic properties of certain medicines, to have recourse, in the latter stages of low fevers, to the most energetic of them, particularly the nitrate of potash, the chlorate of potash, the muriate of ammonia, camphor, and the terebinthines, cinchona, &c. in various combinations, either with each other, or with different stimulants and tonics, with the view of exciting the nervous influence, of supporting the powers of life, and of counteracting the changes, frequently terminating in a dissolution of the vital crasis and cohesion of the fluids and soft solids. But in fevers, which are characterised by excessive action at the commencement of excitement, and by extreme exhaustion, loss of irritability, and deprivation of the fluids, in the latter stages, a too early recourse to some of these medicines may increase the morbid action, and aggravate local determinations; while a too cautious reserve of them, either as to quantity or as to the period of fever, may allow the diseased changes to proceed without interruption to a fatal issue. It is, therefore, imperatively required of us, that we should determine, by attentive observation, both the exact period in which medicines of this description should be commenced with, and the particular substances that should be first employed. As respects the kinds of fever just alluded to, as well as those forms which are either nervous, or more uniformly putro-adynamic, at earlier stages, we are at no loss for means, which are both refrigerant and antiseptic, and which may be employed from the commencement, either when excitement is most excessive, or when it is entirely absent, if due care be taken in the mode of prescribing them. By this early attention, particularly in putro-adynamic and inflammatory putrid fevers, to those means which may best preserve the fluids from the changes they are apt to undergo, especially when these fevers are left to themselves, or injudiciously treated, the advanced stages are rendered much more mild and even manageable. The more refrigerant of the substances, formerly termed antiseptics, as nitrate of potash, nitrate of soda, muriate of ammonia, &c., when duly administered in the early course of fever, and combined with or followed by those which are more stimulant and tonic, as camphor, cinchona, chlorate of potash, arnica, &c., as exhaustion and signs of putro-adyndamia appear, will generally prevent the more dangerous changes in the fluids from taking place. The *muriate of ammonia* is now seldom used internally, although HOFFMANN, JACOB, BARCHUSEN, LOEBECKE, TISSOT, WERLHOFF, MONRO, HIRSCHEL, HILLARY, M'CAUSLAND, GMELIN, and others, have recommended it highly in putro-adynamic fevers. I have frequently employed it; and Dr. CONWELL has found it of great service in the fevers of India. SCHMIDT prefers it in such cases as are attended by diarrhoea.

591. About the time when M. LABARRAQUE discovered the *chlorides of soda* and of *lime*, cases of fever of a putro-adyndamic or malignant form were frequently occurring in an institution to which I am consulting physician. I had made

trial of various methods of treatment, but found camphor, in large doses, variously combined, and aided by other means according to the peculiarities of the case, the most successful of any. Shortly afterwards, M. LABARRAQUE's process for preparing these chlorides was published at Paris; and as early as 1825 I procured them from Mr. Monson, for the use of this, and another institution, to which I was physician. I employed them internally, in enemata, and externally, and as disinfectants; and the results were such as have induced me to have recourse to them ever since, in the various circumstances and diseases in which I have recommended them in this work. The *chloride of soda* is a valuable medicine in all the typhoid forms of fever, when judiciously prescribed. It may be given early in the putro-adyndamic variety, when excitement is imperfect or low, and the skin discoloured, or petechiæ are appearing, and continued throughout the disease. But when vascular reaction is considerable, or local determination prominent, particularly in the nervous and exanthematic varieties, this substance should be withheld, until these states are subdued, or about to lapse into the nervous stage. — At first it ought to be prescribed in small doses, so as not to offend the stomach — in from ten to fifteen drops of the solution, as prepared by LABARRAQUE, every three or four hours, in camphor julap or in an aromatic water. As the disease passes into a state of exhaustion or of manifest putro-adyndamia, or when there are a lurid skin, low muttering delirium, stupor, metecrisis, black sordes on the tongue, teeth, &c., the supine posture, inconspicuous offensive evacuations, petechiæ, blotches, a disposition to gangrene in parts pressed upon, coma, &c., it should be given in larger doses, or more frequently, and in tonic infusions or decoctions, or with camphor, serpentaria, or other stimulants and tonics. I have seen it productive of great benefit in such cases; but it should be commenced before these symptoms appear, and be persisted in, as its good effects are seldom manifest in less than three or four days, or more; and it should not supplant the use of wine, opium, suitable nourishment, and other means which the stage of the disease and peculiarities of the case may suggest. It should also be frequently administered in enemata; and the surface of the body ought to be often sponged with a stronger solution of it in warm water, with the addition of camphor. M. CHOMEL has lately given the *chloride of soda* an extensive trial; and he states that it has proved more successful in low fevers than any other means, when perseveringly employed. Dr. GRAVES has also recently employed it, and has found it extremely serviceable. It acts, first, on the tissues with which it is brought in contact, as a gentle stimulant and antiseptic; and is most probably partially decomposed in the digestive organs, and reduced to the state of common salt. In this state it is carried into the circulation, where it supplies the waste of this substance that has taken place in the early stage of the disease.

592. The *chloride of lime*, in doses of one or two grains, may be also employed with great advantage. When exhibited in solution, it will be preferable to commence with half a grain every hour, or with a grain every two hours, gradually increasing the quantity as the stomach

may tolerate it. It is best adapted to the more extreme case: of putro-*adynamia*, and especially to those attended by urgent diarrhoea and meto-*rismus*. In these it may be conjoined with camphor and other stimulants. It was employed by Dr. REID, of Dublin, in low fevers and in dysentery, a few months after the period of my having first had recourse to the chloride of soda. It may be prescribed in the same circumstances and combinations as the latter; but is not so generally appropriate, nor does it admit of so early, or of so prolonged, an exhibition.*

593. *h. Alkalies and alkaline carbonates* have been employed in various states of typhoid fever, and frequently with service. The carbonate and other preparations of ammonia have been very generally resorted to when diffusible stimuli have been required. In the early stages of these fevers, the carbonate may be used, with advantage, to make a neutral saline mixture with the pyroigneous acid, and either the alkali or the acid may be given in excess, or the mixture may be taken whilst effervescing. The preparations of ammonia are most useful in the nervous and exanthematic varieties of typhoid fever; and in conjunction with camphor, or with tonic infusions, in the nervous stage. In the putro-*adynamic* state, they have seldom appeared to me to have any good effect, unless combined with these, or other tonics.

594. The carbonates of soda and potash are seldom used unless to form neutral citrates or tartrates, and to obtain the fixed air given out during the combination. The advantages of this latter are, however, by no means considerable; but the salts themselves are of service, by supplying, in some respects, the place of that commonly employed. The subcarbonate of soda has been occasionally used, and is recommended by Dr. STEVENS as an ingredient in his saline powders. In the more *adynamic* states of typhoid fevers, or in the intestinal complications, the subcarbonate of soda should be given in a tonic infusion or decoction, with camphor, and with opium, or extract of poppy, or compound tincture of camphor, to prevent it from relaxing the digestive mucous surface, and from increasing the diarrhoea. Unless it be thus combined, or conjoined with the chloric salts, which Dr. STEVENS directs, it may not only aggravate the affection of the bowels, but also favour relapses, or cause the disease to pass into the dysenteric complication. An acetate of soda, formed by pyroigneous acid, with an excess either of the acid, or of the alkali, according to

the state of disease, and taken whilst effervescing, or afterwards, appears to me, from the few cases in which I have had an opportunity of using it, to deserve a more extensive trial.

595. The salts employed by Dr. STEVENS, viz. the muriate of soda, the subcarbonate of soda, and the chlorate of potash, cannot be supposed to act; even upon the digestive organs, in the states in which they are prescribed, without undergoing some change from their mutual action, and from the fluids with which they mix. Indeed, the results may be assumed to be muriates of soda and of potash, and subcarbonate of soda, taking the proportions of the individual salts into consideration. When these salts are taken into the stomach during the middle and latter stages of typhoid fevers, the passage of at least a portion of them into the circulation may be expected, and the loss of the saline ingredients of the blood in the early stages, argued for above (§ 588.), will be supplied. Upon this principle, and for the reasons there stated, this method deserves a more extensive trial than it has hitherto obtained; and when the nature of the salts, and the modes of their operation, are considered, it does not seem to differ materially from that by means of the chloride of soda, first adopted by myself.—There are certain points upon which Dr. STEVENS very strongly insists, and which are partly contradicted and partly confirmed by former observers: these are—1st, The superabundance of acid in the excretions; 2d, The influence of all acids in rendering the blood dark and grumous; and, 3d, The mischief produced by them in the latter stages of fevers. Now, without disputing the accuracy of the first statement, although a confirmation of it is required; I will admit the truth of the second; for it agrees with my own experiments, and with those performed by writers early in the last century, to whom I have referred in the article BLOOD (§ 135.). That acids will be injurious in the latter stages of fever, seems a rational inference from these experiments, in connection with the dark and morbid state of the blood at that time; and yet numerous writers have recommended them, and adduced proofs of their good effects even in the most malignant states of remittent, continued, and exanthematic fevers. The muriatic or hydro-chloric, citric, and pyroigneous acids have been severally employed in these states, and found of service; but they have also frequently failed. That the blood is black and dissolved in scurvy cannot be doubted, yet the advantages derived from citric acid have been great, unless some remarkable delusions as to the causes and treatment of this disease have existed*; and

* Dr. REID mentions an important fact illustrating the cause of putro-*adynamic* fevers,—a cause which exists to a greater extent than is supposed, especially in large cities, although in a much less degree than in the instance about to be adduced. At Valladolid, during the war in Spain, the palace of the "Holy Inquisition" was appointed for the barracks of a British regiment. Under the colonnade was a well, from which water could be drawn into the uppermost stories. This water had a sweetish decayed taste; but, for the want of better, the soldiers used it both for drinking and cooking. No other regiment in the garrison was so unhealthy; and the prevailing disease was putrid fever, of which there was not the slightest symptom in any of the other regiments. At last the reason was discovered: skeletons were found in the well, and several were observed with pieces of the flesh adhering to the bones. If the chlorides of soda or of lime had been then known, or if that which had been long previously recommended been employed, the mortality from this fever, and from putro-*adynamic* dysentery, would not have been so great as it proved during the Peninsular campaigns.

* From several opportunities of observation, I am of opinion that scurvy has been often confounded with putro-*adynamic* fever; that both diseases formerly proceeded from the same causes, and often occurred simultaneously in the same camp, army, fleet, or ship; that the causes were chiefly putrid water, mouldy and adulterated bread, diseased and unwholesome flesh, vegetable and animal exhalations, insufficient nourishment, and the depressing passions; and that the protracted use of salted provisions of a good quality was but little concerned in producing either of these diseases. During the seventeenth and eighteenth centuries, trading vessels were provisioned as cheaply and as sparingly as possible, and fleets and armies were provided by contractors who enriched themselves and those who passed their supplies at the expense of the lives of thousands. Bread which was actually nauseous; the flesh of animals dead of epizootics; provisions which had been either salted for years, or nearly half putrid; numbers sleeping in a small space

such actually appears in some measure to have been the case. The truth, however, seems to be, that whilst pathologists have lately been occupied exclusively with the living solids, Dr. STEVENS has concerned himself only with the blood, and kept too much out of view the influence of life, especially as manifested in the organic nervous system, upon both the circulating and secreted fluids.

596. As far as my own observations enable me to form an opinion as to the respective merits of these acids, and of the alkaline subcarbonates and salts, I conclude—1st, That the *acids* may be of service early in fever, whilst vascular excitement is considerable, although vital power may be weak; that they seldom will be injurious in this period, as long as the skin continues warmer than natural, and the blood preserves its colour; and that but little confidence should be placed in them when the surface is at, or below, the natural temperature, or materially discoloured, unless they be conjoined with substances calculated to excite the powers of life. 2d, That the *subcarbonates of soda and potash*, the solution of *chlorine*, and the *chlorides*, are preferable in the middle and latter stages, more especially when the blood appears morbid, the skin discoloured, and the excretions offensive; but that the subcarbonates should not be trusted to in the last stages of typhoid fevers, unless conjoined with substances calculated to support the vital energies; and that, at this period, *chlorine*, the *chlorates*, and *chlorides*, should be preferred, as being more tonic, stimulant, and antiseptic than the carbonates. 3d, That the *sulphate of soda*, the *phosphate of soda*, and the *sulphate of magnesia*, are severally of service in the stage of excitement, when they may be given, at first so as to act gently on the bowels, and afterwards in small doses, as refrigerants, or alteratives; and that the *muriate of potash*, the *citrates*, and *acetates* may likewise be employed with the latter intentions. And, 4th, That circumstances may occur, in which it will be advantageous to exhibit the neutral salts with either an acid or an alkali, as the *muriate of soda*; with a vegetable acid, as prescribed by MORICAN; or with soda, as advised by STEVENS; or to prescribe saline substances with an excess of either of their constituents, as the *murates* with an excess of acid or of alkali.

597. *i. Opium, &c.*—Much difference of opinion has existed as to the propriety of giving opium in typhoid fevers. But when we find SYDENHAM, POILLORE, ROLFINCK, SCHLEGEL, VAN HOOVEN,

and imperfectly renewed air; the constant evaporation from the too frequently washed decks; water kept in wooden casks until it became blackish, ink, stinking, and nauseously putrid; were causes often in protracted and simultaneous operation. I have never been in a ship in any other capacity than as a passenger; but some of my voyages have been long, and have afforded me occasions of witnessing, even at the commencement of the nineteenth century, the existence of some of these causes. For many years matters have been altered, especially in the navy. The mutiny at the Nore; the advance of knowledge; the stricter attention to the supply, preparation, and quality of the provisions; the preservation of water in iron tanks, and some other subordinate circumstances; have done more to banish putrid fevers and scurvy from our fleets, than the use of citric acid; or any other antiseptic or antiseptic; and I have no doubt that the prevention of these causes, and the general adoption of the *chlorides*, will be found the most certain means of preventing and of curing these diseases.

HOME, HORN, MARCUS, LATHAM, STOKES, GRAVES, &c. favourable to the practice, the grounds of dissent from it ought to be carefully examined. There are circumstances and states of fever which forbid its use, but there are others which as imperatively require it; and I believe that the objectors err grievously in not discriminating between them, and in not studying either the conditions which contra-indicate it, or the modes of exhibiting it in the cases that would be benefited by it. SYDENHAM considered that it prevented coma, or stupor, when given after vascular and alvine evacuations had been judiciously employed. OMBELLIUS, GILCHRIST, HOME, and GRAVES combined it with antimonials; and the propriety of the practice cannot be doubted, in the circumstances in which they employed it. In the present day, the indications for the exhibition of opiates have been so ably stated by two accomplished physicians—Dr. LATHAM and Dr. W. STOKES—that whatever I may advance as to this subject must in great measure be an echo of their observations. When the disorder of the sensorium outruns the other symptoms; when by venæsection or topical bleeding, or by alvine evacuations and refrigerants, the general and local symptoms are relieved, but the delirium still continues; when to this state are added, tremors, subsultus tendinum, and unrestrained evacuations; when there has been at first high vascular excitement, and large evacuations have been required to guard the brain or other organs from mischief, and wild delirium has followed; if the patient has previously been in a delicate or nervous state; if he has been addicted to an excessive use of spirituous or vinous liquors, particularly the former; if the habits of the patient and his occupations have been such as to inordinately excite and exhaust the sensorium; or if the anxieties, the toils, or the debaucheries of life have previously injured the health, and more especially the state of nervous energy;—in these several circumstances, should opiates be resorted to, in the advanced progress of typhoid fevers, and of synchoid fever that has passed into the nervous or typhoid state. On most of these, Dr. LATHAM has insisted with great precision and force; and I entirely subscribe to the value of his remarks. Dr. STOKES remarks, that *three* circumstances call for the use of opium in fever: 1st, Where there is persistent watchfulness; 2d, Where an inflammatory condition of the brain has existed, and been subdued, but delirium or other nervous symptoms still remain; 3d, Where an excited state of the sensorium exists without heat of scalp, or remarkable throbbing of the arteries of the head; and to these I may add a fourth, Where there are much relaxation of the bowels, unrestrained evacuations, tremors, watchfulness, or delirium, or subsultus tendinum.

598. The mode of exhibiting opiates is sometimes of great importance. In many cases, one or two grains of solid opium may be given, either alone, or with camphor and nitrate of potash. The combination with camphor is to be preferred, when there is much adynamia, and no inflammatory determination to the brain. When the bowels are very remarkably disordered, ipecacuanha may be added to these. The *acetate of morphine* is often superior to pure opium, when given in doses of from a quarter to half a grain, with camphor,

or with aromatic spirits, or warm spices, as Cayenne, &c.; particularly in cases of extreme prostration. The *muriate of morphine* may be preferred, if the chlorates are also prescribed. Opiates are sometimes of service when exhibited in small mucilaginous enemata. HILDENBRAND, who is averse from the use of opium in the exanthematic typhus, unless under circumstances manifestly indicating it, very justly remarks that, when it is determined upon, it should be given in a full or large dose, once or twice repeated after a proper interval, rather than in small and often repeated doses.

599. Other narcotics may be prescribed in certain states of typhoid fever, but they are not so deserving of confidence as opiates. The extracts of *poppy* and *hyoscyamus* are occasionally useful, particularly when opium disagrees; but even in such cases, the acetate of morphine, prescribed as just directed, will be of service. BNERA praises *belladonna* in the states of fever indicating the propriety of having recourse to opium. This narcotic is sometimes useful in the delirium attendant on erysipelas of the scalp. Mr. BLACKETT (*Lond. Med. Repus.* vol. xix.) recommends it in similar circumstances. It seems deserving of trial in the states of nervous fever mentioned above, and in the nervous stage of exanthematic typhus.

600. *k. The use of wine and of some other stimulants* requires much discrimination. It has been supposed by some writers, that wine is contra-indicated where there are delirium; a dry, black, or red tongue; red or suffused eyes; or much heat of surface. This is partly true; but one, or even more, of these symptoms may be present, and yet wine will prove of great benefit. Indeed, wine may be exhibited in the same circumstances as require the use of opium. When the delirium is of the kind above stated (§ 597.), and is accompanied with the same phenomena, &c.—when the state of the tongue is the result of extreme adynamia, inflammatory determination having been subdued—when the suffusion or redness of the eyes is the result of want of sleep, and is attended by a cool scalp—and when the heat of skin exists chiefly on the trunk, and is attended by indications of putro-adynamia—then wine will be given with benefit, and it is even indicated. This subject has been very ably canvassed by some contemporary writers, particularly by Drs. WILSON, PHILIP, ALISON, GRAVES, STOKES, and TWEEDIE, whose experience gives weight to their opinions; and they very nearly concur with me in the propriety of exhibiting wine with due precaution even in these circumstances, as well as in others which are less doubtful.—GILCHRIST, HAISHAM, HALLS, WENZEL, HARLES, MATTHÆI, HUFELAND, HORN, and others, even notice the influence of wine in reducing the heat of skin in fevers tending to putro-adynamia, and my own experience confirms the observation.

601. The indications for the exhibition of wine in the typhoid states of fever may be reduced to the following:—(a) When the patient has been proceeding favourably, and the pulse suddenly becomes weak, very soft, or irregular; the skin cool or damp; the countenance collapsed; and the strength prostrated;—(b) When the patient complains of a feeling of exhaustion, and expresses his wish for wine or support;—(c) When vital depression occurs unexpectedly or suddenly, or

without any evident cause;—(d) When the depression is owing to injudicious depletions, or excessive evacuations, or to the depletions or other means required to subdue inflammatory determinations at an advanced stage, or to protracted or excessive diarrhoea, or to hæmorrhage from the bowels, or from any other part;—(e) When, with these symptoms, the abdomen becomes tympanitic, and the exhaustion increases;—(f) When the delirium is low, muttering, and constant, and attended by tremors, or subsultus tendinum; the surface, and particularly the scalp, being cool, the pulse soft, weak or small, and the posture supine;—(g) When petechiæ or vibices of a dark hue, and other signs of putro-adynamia, appear; the scalp being cool, and the action of the carotids not materially excited;—(h) If early convalescence be slow, unattended by local affections of an inflammatory tendency, and owing chiefly to debility;—(i) If, with one or more of the foregoing indications, or with a soft pulse, moist tongue, or cool skin, in the latter stages, it be ascertained that the patient has been addicted to spirituous liquors, or to wine in excess;—(k) and if the character of the epidemic be of a low kind, and if the early excitement be attended by weak vital resistance, and soon pass into exhaustion—then the propriety of having recourse to wine or other active stimulants, with requisite precautions, cannot be disputed.

602. The kind of wine, its quality, and its quantity, are deserving of particular attention.—Old sherry, Madeira, and white hermitage, of the best quality, should be preferred. The red and acid wines are most apt to disagree; yet port and red hermitage are useful in some cases, particularly when diluted, and conjoined with aromatic spices, in the form of negus. NAVIER recommends champagne; but it is suitable only to the stupor or coma attendant upon an extreme state of adynamia.—The quantity of wine given in the twenty-four hours should depend upon several circumstances; but it may vary from four or five ounces to sixteen or twenty. Dr. BATEMAN thinks that it should not exceed a pint: very much larger quantities have, however, been given with benefit; but these are only the exceptions from the general rule. Regard ought to be had to the age and previous habits of the patient, as well as to the state of the disease. Young persons are readily excited, and should take only the smaller quantities. Older patients, and those especially who have been habituated to much wine, or to spirituous liquors, often require the full amount just named. The use of it ought always to be commenced in small quantities, and increased as the indications may guide the practitioner. In all cases, it should either be diluted, or given in the patient's food; and the effects carefully watched.—Dr. TWEEDIE justly observes, that, if the patient relishes the wine, if he is tranquillised by it, and if there is a gradual and steady improvement in the symptoms, without any marked excitement after it has been taken, benefit will result from it. On the other hand, if the pulse or heat of the skin are much or quickly raised by it; if the face becomes flushed, and the patient restless or incoherent; wine is either improper, or the quantity has been too great. If, after having been stimulated, he soon lapses into the previous state of exhaustion, or

seems weaker from each successive dose, no advantage will be obtained from it. When wine has produced the desired effects, it should be gradually withdrawn.

603. Other *fermented liquors*, particularly when bottled, and even *brandy*, have been used, in the circumstances indicating the use of wine. I have employed bottled stout with benefit. It is an excellent vehicle for the subcarbonate of soda or of potash, or for small doses of the muriates, or for both conjointly, and is most appropriate to the advanced stage of putro-dynamic fever. Spruce beer, ginger beer, and Seltzer water, may severally be employed, and in a similar manner. Brandy ought to be much diluted, and is best suited to those who have been habituated to spirituous liquors. In cases attended by a protracted or colliquative diarrhoea, and extreme prostration, the brandy should be burnt, and given in some thin sago or arrow root.

604. *Yeast* has been frequently recommended in typhoid fevers. Dr. STOKER considers, that it may be given in all the stages in which it can be retained by the stomach, even when the existence of inflammatory complications prevents the use of other stimulants; and that it is generally easily taken alone, or with any other medicine, or in any vehicle that may be deemed advisable. In the worst forms of typhus, when it is most needed, he states that it is rarely rejected, but, on the contrary, is much relished; and that it is moderately laxative, often superseding the use of purgatives. If it prove not sufficiently aperient, he gives a little tincture of jalap in it; and if the bowels are too much relaxed, a few drops of tincture of opium are added to each dose. It appears to Dr. STOKER to correct the morbid contents of the alimentary canal, and the consequent symptoms of putrescence; petechiæ and black tongue being more effectually removed by it, than by any other means. He has, therefore, substituted it for bark and wine, when they could not be employed on account of inflammatory symptoms, and has conjoined it with them when there was no such counter-indication. He prescribes the yeast in doses of two table-spoonfuls every third hour, with an equal quantity of camphor mixture. If administered in enemata, three times the above dose may be employed. Dr. STOKER, whose experience of this treatment has been long and most extensive, observes that, instead of increasing the tendency to tympanitic distension, by promoting fermentation, as may be objected, it actually prevents the accession of this symptom; and that, in the most obstinate instances of typhoid tympany, he has found enemata of yeast and assafoetida the most efficacious remedies.

605. Other *stimulants* require little attention. *Musk* has been recommended by the FRANKS, GEBEL, GRELIN, MARCUS, HORN, STOKER, and others in cases of true adynamia—of extreme prostration, with much affection of the sensorium. It may be prescribed in the same circumstances as admit of the use of wine. THOMANN, however, found it quite inefficacious. It should be given in large doses to be of any service—from ten to fifteen grains, with camphor or ammoniac, or other medicines which the peculiarities of the case will suggest. *Phosphorus* and *phosphoric acid* have likewise been employed. They do not appear to possess any

claims to particular notice; but may be injurious if too liberally or inappropriately administered. I have seen benefit derived from the infusion of *green tea*, when the stupor or coma has been great; and I believe that strong *coffee* has sometimes proved useful in similar states. It has been recommended by ZAMBELLI and GRINDEL. The warm *spices*, especially *capsicum*, are often of service, and may be given in considerable doses in the latter stages of typhoid fevers, but chiefly as adjuvants or corrigents of other remedies. The *spirits of turpentine* are frequently productive of benefit, when prescribed in small doses, with aromatics or spices; but a large dose may be attended by very serious consequences, when exhaustion is extreme. It is an excellent medicine in enemata, with castor oil, muriate of soda, or other purgatives, when the bowels require to be opened; and with assafoetida, or extract of rue, when there is much tympanitic distension. Substances of a similar kind, or the usual carminatives, have been directed in enemata by THOMANN and HUFELAND, in order to remove this symptom; but the injection just recommended is the most certain in its effects. The means noticed above (§ 158.) may also be resorted to. When there is hæmorrhage from the bowels, these are generally efficacious. If they fail, a solution of the superacetate or lead, in pyroligneous acid, with the addition of *kræonate*, may be thrown up, in any vehicle which the peculiarities of the case may require.

606. Many practitioners are averse from giving stimulants or tonics in typhoid fevers, from a fear of thereby aggravating or inducing inflammatory determinations. But even where the nervous inflammations noticed above (§ 508.) may be presumed to exist, and particularly in an advanced period of these complications, a judicious use of stimulants is actually necessary. It is a well known fact, and well expressed by Dr. W. STOKER, that, at a certain period of inflammatory affections, stimulants become antiphlogistics; and this is more especially the case in respect of these affections, when they occur in the course of fevers. The nervous energy is then depressed, irritability is most remarkably impaired, the fluids changed, and the whole constitution incapable of manifesting the phenomena, or of developing the lesions, constituting true or sthenic inflammation and its consequences. A spurious or asthenic state of action only, quickly passing into disorganization, can possibly take place in these circumstances; and it can be remedied solely by stimulating and antiseptic means. These facts are frequently placed before our senses, and demonstrated by the treatment found most beneficial, as well by that most injurious, in malignant sore throat.

607. I. Various *external means* have been suggested for typhoid fevers. Some of the most serviceable of them have already been noticed. The *cold affusion* over the general surface is very rarely admissible in this class of fevers; but applied to the head only, it is often of manifest service, when the determination to the encephalon in the early stage of excitement is great, or when the delirium is high or maniacal, or attended by increased heat of the scalp, and excited action of the carotids. In these cases it lowers morbid action remarkably, and procures sleep. *Tepid bathing* and *sponging* are favourably noticed by BROCKLESBURY, WOLFF, JACKSON, HALLÉ,

BRANDIS, and others. *Tepid* or *warm sponging* with a solution of the chlorides, or of the nitromuriatic acids, or of camphor in pyroligneous acid, are deserving of general adoption. Tepid or warm aromatic baths, or sponging the surface with infusions or decoctions of aromatic plants, have been employed by MARCUS, HORN, HARTES, and DUPIN. KERASIG advises warm aromatic embrocations to be placed over the abdomen, when there is diarrhoea or meteorismus.—The use of *blister*s has been sufficiently noticed. They may be applied over, or near, the affected organ, when the affection consists chiefly of congestion, or impaired action. In other circumstances, they may be used as derivatives. This remark is applicable to the use of *sinapisms*, and to the warm turpentine embrocation. CALISEN recommended *boiling water* to be used as a blister and derivative; and the idea has been adopted by some recent writers. One of the most beneficial external means that can be employed, is a liniment, consisting of the compound camphor liniment, with soap and Cayenne. This may be rubbed gently but assiduously over the hypochondria, or insides of the thighs, twice or thrice daily. I have occasionally resorted to this treatment, for upwards of twenty years, and often with great benefit. Several of the *liniments* prescribed in the *Appendix* may be used; but the Cayenne should be added, particularly when sensibility and consciousness are impaired.—*Dry cupping* may also be tried as a derivative, during the early or middle stages of the disease. In the putro-dynamics fate it is seldom admissible.

608. iv. As to the *Prophylactic Measures* that may be resorted to in typhoid fevers, it is unnecessary to add any thing to what is stated above (§ 117. *et seq.*), and in the article INFECTION. The mean there recommended are quite applicable to the sediseases.

609. v. The *Diet and Regimen* in typhoid fevers are particularly deserving of attention. Both ought to be suited to the stage and form of the disease.—a. In the early period of excitement, the air should be pure, dry, cool, and without any current. The apartment should be large and open, the bed without curtains, and the air renewed, without exposing the patient to any chill. Barley water, fresh whey, rice gruel, or common gruel, with a little salt, when the excitement is low, or when thirst is not much complained of, may be employed as the usual beverage. The temperature of the drink, and of other ingesta, should be tepid or somewhat above it. If bronchial or catarrhal symptoms are present, warm mucilaginous, and mild diaphoretic drinks should be allowed. It is improper in this stage to attempt to excite perspiration by warm coverings. If stupor is present in this stage, the external senses may be stimulated, and neither light nor noise need be excluded.

610. b. In the *nervous stage*, the air of the apartment should not be too cool; and the bed-clothes ought to be warmer. A uniform temperature, and the purification of the atmosphere, must be always attended to. A cold, moist air, and currents of air, during this stage, induce diarrhoea, bronchial or pulmonary congestions, or other dangerous complications; whilst a too warm, close, and impure air, particularly when breathed by a number of persons, favours the

development of putro-adyamic changes. The greatest cleanliness is requisite. Neglect of this produces gangrenous sores and ulcers, particularly where pressure is made, or slight bruises have been inflicted. The tongue should be scraped, and the teeth and mouth washed with salt and water, or gargled with them or with the chlorides, if the patient can do so. The hair may be cut off in the early stage; but the removal of it in this may be injurious, if the adynamia is extreme, and the scalp cool at the time.

611. In the *nervous stage*, bland, very digestible, and fluid nourishment may be allowed. The drinks should be mucilaginous, and gently warm. Whatever food or drink is used, whether gruel, thin arrow-root, &c., or weak animal soups, broths, beef tea, &c., should contain the usual quantity of salt, for the reasons stated above (§ 589.). If the treatment by the chlorides, &c. is adopted, this becomes a matter of less importance. Fruit tends to produce diarrhoea, and is seldom admissible. Wine, as advised above, is generally required, particularly when this stage passes into extreme prostration; and may be given in the nourishment adopted, or in soda water, Seltzer water, &c., diluted with warm water, or with tepid fresh whey. If brandy be used, it may be given in the same vehicles, or in weak black tea, in a state of much dilution. In the true typhus, stimulating the external senses is more necessary in this stage than previously; and it is often beneficial, as HILDBRAND and NAUMANN advise, to rouse the patient's moral sentiments and affections, and to disperse his fugitive and chaotic ideas, by recalling former associations and objects of affection or of ambition. In extreme cases, however, the physical powers should be excited at the same time as the moral; otherwise the latter will be appealed to in vain. In a case of putro-adyamic fever, in which I took great interest, these united means proved successful in rallying the energies of life, under peculiarly unfavourable circumstances. During an expected crisis, a greater warmth of the bed-clothes is proper, and warm whey or other appropriate fluids should be given to encourage salutary evacuations (§ 167.).

612. c. During the *abutement* of the disease, the importance of diet and regimen increases, as treatment by medicine is now gradually abandoned. Nourishing food of easy digestion, taken in small quantities; pure air, and wine in some cases, are generally required; but these should be strictly prescribed as to kind, quantity, and frequency, according to the peculiarities of the case. As convalescence becomes established, the animal broths and soups may be succeeded by a little solid animal food, of the lightest kind. The dangers to be apprehended during recovery have been fully stated above (§ 168.), their causes assigned, and the means of preventing them pointed out (§ 169.). Little further is, therefore, now required. But it will be most useful to recollect, that the management of convalescence should have some reference to the particular form and complication of the disease. In the exanthematic typhus, the danger of consecutive disorder is the least, particularly if it have run its course regularly and terminated by crisis. After low, nervous, and putro-adyamic fevers, affections of the brain, liver, bowels, lungs, and me-

sentifer glands, are not unusual, particularly when the patient has been prematurely exposed to changes of weather, to irregularities of diet, &c., and when the treatment has been injudicious, during early convalescence, or too soon relinquished. In all the varieties, the risk of these affections is increased by the complications which the fever presented; the organ which was prominently deranged remaining longer weak, or more susceptible, than others, of being disordered by excitation, or by injurious agents. Therefore, in cases where the predominant disorder has been expressed on the encephalon, particular care should be taken to preserve the sensorial functions from early excitement or irritation, or undue exercise. Where the respiratory organs have been much affected, premature exposure to cold, or to changes of temperature, &c. ought to be guarded against; and where the digestive organs have manifested the onus of morbid action, the return to a full or stimulating diet should be long delayed, and the most digestible food only ought to be taken, and in moderate quantity. (See further on this subject, § 167—170.; and art. DEBILITY, § 36—46.)

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FEVER, PUERPERAL; see PUERPERAL DISEASES.

FEVER, SCARLET; see SCARLATINA.

FEVER, YELLOW; see PESTILENCES.

FIBROUS TISSUE — ALTERATIONS OF THE.

CLASSIF. — SPECIAL PATHOLOGY — Morbid Structures.

1. A. The Fibrous System consists — 1st. Of fibrous membranes — *membranæ fibrosæ* — as the peritoneum, the cerebral and spinal dura mater, the fibrous capsules, the sheaths of tendons, the aponeurotic expansions, the scleroticæ, the capsule of the corpora cavernosa penis and of the clitoris, &c., the tunica albuginea, and the membranes proper to the spleen and kidneys; — 2dly. Of fibrous cords, in which the fibres are formed into fasciculi — *organa fibrosa fascicularia*. — Several of the former should be viewed as compound structures; as the dura mater, the tunica albuginea, the fibro-synovial sheaths, &c.; but the fibrous tissue constitutes their chief basis. With the exception of the fibrous membranes of a few glandular organs, it is easy to demonstrate that all the fibrous structures are connected together, and that the peritoneum is the centre and basis of connection. This tissue consists of whitish, or grayish, shining, satiny, fibres of great fineness and strength. These are interwoven in various directions, in the first division of this tissue; and are placed parallel and very

close to each other, in the second. Their cohesion is very great. Hence the fibrous tissue is the strongest in the body. Although it must be inferred to possess vessels and nerves, yet neither have been actually traced into it. That it is endowed with vital properties cannot be denied; but it manifests them obscurely in health, but often very remarkably in the course, or as a consequence, of certain diseases. Its physical properties are most perfect when the powers of life are energetic, and are much impaired when these are depressed or exhausted. During prolonged debility, and in cases of extreme vital exhaustion, the cohesion of this tissue is diminished, and laceration or extension of it takes place with less violence. During constitutional disorder, or contamination of the system by specific maladies, and in the scrofulous or gouty diathesis, it often becomes the seat of morbid action, and then evinces vital properties in a most evident manner. Injuries and irritations of this tissue, particularly when the vital functions are impaired or disordered, are often the source of the most violent and dangerous affections. — The fibrous tissue, however, is, with the exception of the peritoneum and the capsules of joints, not very prone to disease; and, even when these are affected, a scrofulous or syphilitic taint has been the cause.

2. B. Leaving out of consideration the congenital alterations of this tissue, I will briefly notice those changes of it which are usually the result of disease. — a. Fibrous parts are seldom thinner than natural, or atrophied. — b. Thickening is much more frequent, and is evidently the result of slow inflammatory action. — c. They may also be expanded or distended by morbidly increased bulk of the organs which they envelope. We occasionally meet with this change in the fibrous coverings of the spleen, kidneys, articular capsules, &c. When the expansion arises from the accumulation of fluid, it is generally attended with thinning; and then, in some cases, the distension is chiefly in one part only, in the form of a sac, or is irregularly elongated. But the expansion may also be conjoined with thickening, as when it has proceeded from the changes consequent upon an inflammatory state of the contained parts, in which the fibrous envelope itself had participated, as in diseases of the spleen, &c. — d. The articular ligaments and capsules, however, are frequently elongated and expanded without any internal change, and merely from diminished tone or vital cohesion — in some cases so much so, as to give rise to dislocations. — e. Fibrous parts may be also too short or too narrow. Morbid contractions are observed in tendons and ligaments, and are generally the result of inflammatory irritation consequent upon great extension, cramp, &c. — f. The changes of colour met with in this structure are generally associated with change of organisation, excepting in jaundice. The morbid colours most frequently observed, are various shades of yellow, seldom brown, and rarely black, as in melanosis.

3. C. The continuity of this structure is sometimes destroyed; but generally from wounds, sudden extension, as in dislocations, and external violence of any kind. Continuity may likewise be destroyed by purulent collections, by tumours, and various morbid depositions between its fibres; but there is here, with a few exceptions, rather

an expansion of the structure than actual breach of continuity. Incised wounds of this tissue heal in general with tolerable ease, in a healthy state of the system. But this is by no means the case when the habit or constitution is in fault, or when there is obvious disorder of the stomach and liver; and the difficulty is still further increased if the injury is attended with loss of substance, or when the tissue is lacerated. In these latter, the continuity of structure is in some measure supplied with cellular tissue, which becomes very dense by degrees, but never altogether tendinous. Hence the disposition to rupture or dislocation that exists so long, and indeed ever after such accidents. The chief exception to this is presented by the periosteum on some occasions, where it seems to have been quickly restored.

4. *D.* The texture of fibrous parts is changed generally by inflammation and its effects. But this disease is not frequent in fibrous structures, excepting the periosteum, the articular ligaments and capsules, and the dura mater.—In all these parts, however, it more frequently follows external injuries, than arises spontaneously. When it is spontaneous, it is almost always merely a concomitant of other diseases of a constitutional kind, such as *scrofula*, *syphilis*, *gout*, and *rheumatism*. The inflammation of this structure is rarely of an acute kind, excepting in some forms of gout and rheumatism; and in these the inflammatory state is consequent upon, and subordinate to, a morbid condition of the organic nerves, rather than identical with that which is caused by external injuries, or which assumes the phlogistic character. These specific forms neither pass through the same phases, nor terminate, as common phlogosis. The inflammation, also, proceeding from the scrofulous and syphilitic taint possesses the characteristic features of those specific diseases.

5. *a.* The course of inflammation is much more frequently slow; and often the phenomena are so indistinct, as to be overlooked. The changes thereby induced are generally co-ordinate with the activity and degree of the inflammatory action. *Redness*, in various degrees of depth, and attended with different states of vascular injection, is usually present. In some cases, there is a diffused rose-red, especially when the inflamed tissue has access to the air. In others, more or less large and numerous red spots or irregular streaks are observed. In many, the inflamed part has a more or less yellowish colour; and if it be naturally glistening, this appearance is entirely lost. After chronic, or often-repeated attacks of inflammation, other discolourations are sometimes remarked—the parts being either dark grey, brownish, livid, or even blackish.

6. *b.* *Swelling* is seldom remarkable in inflamed fibrous structures. But if the inflammation continue long, or if it recur frequently without complete resolution, fibrous organs, or the cellular tissue surrounding fibrous structures, are generally greatly swollen, and their boundaries indistinct, with a gelatinous fluid infiltrated into the adjoining texture, giving it a reddish, soft, and cedematous appearance. When the intensity of the inflammation is very high, it runs tediously into suppuration; the swelling and cedematous infiltration of the adjoining cellular substance at first increases, whilst the fibrous tissue wastes,

the effused fluid, at various points, afterwards assumes a puriform appearance, increases, is concentrated, and at last more or less destroys this structure, the swelling at the circumference of the part becoming somewhat diminished.

7. *ii.* INFLAMMATION OF THE FIBROUS STRUCTURE OF THE JOINTS may occur primarily in this part, or extend to it from the lining synovial membrane, which, like other serous membranes, inflames readily, and in which the inflammation of joints most frequently commences. Inflammation of joints, implicating their fibrous structures, generally arises from external injuries, from metastasis of inflammation from other parts, from pus or morbid secretions absorbed into the circulation, from syphilis, gout, rheumatism, &c., and occasions reddening, swelling, softening, &c. of the synovial membrane. If the inflammation be not resolved, there is consequent secretion into the cavity of the joint, sometimes of a fibrous lymph occasioning ankylosis, but more frequently of a puriform matter, or of a fluid, which, after being retained there, assumes a puriform character, and which often softens or erodes the cartilaginous coverings of the heads of the bones. Frequently, also, inflammation of joints commences in the fine membrane lining the cartilages, or in the articular extremities of the bones themselves. This commonly occurs from the scrofulous and syphilitic taints, and gives rise to the *caries articuli centralis vel interna*, of RUST. When the disease originates in the synovial membrane or bones, the fibrous, fibro-cartilaginous, and even the bony parts of the joints themselves, are sometimes co-affected. This is especially the case, when the causes act violently on the joint and affect equally all the tissues composing it, as after a violent injury, such as a penetrating wound, compound dislocation, or fracture extending into it. In all such cases, an acute, and progressing general inflammation of the joint takes place, on which ankylosis, abscess, or caries, are usually consequent.

8. *A.* In the scrofulous and rheumatic, however, a more undecided and chronic state of inflammation occurs, either spontaneously or from injuries, occasioning changes in the joints, which, according to their extent, seat, and symptoms, have been called *morbus corarius*, *hip disease*, *claudicatio* or *lameness*, *luxatio spontanea* or *spontaneous luxation*, *fungus articuli*, *articular fungus*, *white swelling*, &c. However, with all these names, it is essentially the same disease. The joint is more or less remarkably swollen, less movable than in the healthy state, and always somewhat bent. The swelling is, at certain parts, hard, firm, elastic; at other parts, more doughy, or even obscurely fluctuating. The integuments, to the last, even when sinuses are formed, remain unchanged, although sometimes slightly varicose, with a hardened state of the subjacent cellular and adipose tissues. The muscles surrounding the joint often appear pale and, together with the adjoining cellular substance, infiltrated with lymph. The articular ligaments are more or less swollen, of a dull hue, frequently without any distinct fibres, hardened in some parts and softened in others, and often consolidated with the surrounding cellular structure. They are also whitish in some patches, and in others discoloured; generally converted into a mass containing minute cavities filled with lymph,

gelatinous fluid, or ichorous pus. The internal articular ligaments, the cartilaginous coverings of the bones, and the synovial membrane are entirely or partially destroyed. The bones either primarily or secondarily affected are, in a greater or less degree, inflamed, softened, swollen, and become internally carious; or they are but little swollen, tolerably hard, yet superficially eroded, or destroyed by caries. Owing to this carious state of the heads of the bones, whether attended with swelling or not, dislocation takes place. The articular cavity contains at first a large quantity of thickish, albuminous-like, often a pale reddish synovia; and, in later stages of the disease, if the joint be more or less destroyed by suppurative, a thin, frequently foul-smelling, pus, mixed with blood, cartilage, and cartilaginous fragments, fill up entirely or partially the cavity of the joint (Orto).

9. *B. Ossification* is frequently observed in the fibrous structure, particularly in the ligaments and dura mater, and less frequently in the periosteum, the tendons, the fibrous membrane of the spleen; and but rarely in the other parts of this system. It is to be viewed as a consequence generally of slow inflammation, and occurs in different forms: as in some cases only the fibro-cartilaginous base of bone is deposited in plates or roundish-flat prominences; more frequently phosphate of lime is secreted either in distinct spots or small masses surrounded by a circle or plexus of vessels, or in the form of splinters, or, lastly, in larger masses, involving the fibrous tissue equally throughout. If the articular ligaments undergo this change, they are then usually *shortened*, occasioning *stiffness* of the joint, or more or less complete *anchylosis*, according to the extent of the ossification. An *earthy mass*, less resembling bone than chalk or gypsum, consisting principally of the urate of soda—*gouty tophus*—is often deposited in the ligaments, in the neighbouring aponeurosis, and periosteum of one or several joints, in gouty persons, at first in a soft state, but gradually becoming hard, and often in large quantity.

9. *C. Sphacelation, or gangrene*, rarely occurs as a termination of inflammation. It is met with primarily in those fibrous parts which are well supplied with blood-vessels, viz. the periosteum, dura mater, fibrous envelope of the spleen, &c. In the tendons, aponeurosis, and articular ligaments, it very rarely occurs primarily, excepting when they are exposed to the air by wounds or ulcers, in which case they often are destroyed and exfoliate together with the surface of the bones and cartilages. Fibrous structures, however, are often attacked with mortifications in conjunction with, or in consequence of, gangrene of the adjoining parts. Anthrax sometimes extends to and destroys fibrous tissues; and when mortification attacks a limb, the articular ligaments participate so entirely, that a spontaneous separation often takes place at a joint.

10. *D. Adventitious productions* are but rarely observed in the fibrous system.—*a. Encysted tumours* seldom form in it, if we except those bursal tumours which occur on the tendinous sheaths and articular capsules, and partly between the tendinous fibres of the aponeurosis, and especially on the elbow-joint and knee-cap, and which have their origin in the mucous bags placed in these situations.—*b. Tubercular formations* are equally rare in fibrous parts. Scrofulous deposits

are, however, occasionally found in the dura mater and periosteum.—*c. Sarcomatous and fungous tumours* are more frequent in fibrous structures, particularly in the periosteum. Fungous growths on the tendons are more rare, as are the sarcomatous swellings upon the articular ligaments.—*d. Carcinoma, or cancer*, does not occur primarily in this system, but attacks it secondarily equally with other parts.

11. *E. The changes observed in the contents of cavities formed by fibrous membranes* are frequently marked and important. Morbid collections, as a watery serum, a gelatinous fluid, puriform matter, blood, &c., are not infrequently found in the aponeurotic sheaths surrounding or separating the muscles in the cavities of joints. The *synovia* also varies exceedingly; sometimes it is deficient in quantity, so much so as to occasion stiffness, creaking or a peculiar noise of the joint. More commonly it is in unusual quantity, particularly in all inflammatory states of the synovial membrane, but occasionally without any distinct inflammation, as in the knee-joint, in rheumatic, rickety, or syphilitic subjects. Sometimes the effusion exists to such a degree that the joint is more or less swollen, or even dislocated, or its use prevented. This local state of disease has usually been called *dropsy of a joint*, *hydrops articuli*, *hydrarthrus meliceria*. The synovia is occasionally turbid, reddish, watery, albuminous, gelatinous, &c., as well as increased in quantity.

12. *F. Substances adventitious to the situation* have occasionally been found in the cavities of joints.—*a. Blood* is rarely observed; but—*b. Pus* occurs more frequently, it either having been produced within the joint itself, from an acute inflammation of the synovial membrane, and of the bony cartilages and ligaments forming the joint, or having made its way into the cavity from without. I have, however, seen cases where pus has rapidly collected in one or more joints after *phlebitis*, or after the absorption of this fluid from other and distant parts. It has been supposed, that the pus, in such cases, has been secreted or deposited in the cavity of the joint, as it has passed into the circulation from the situation where it was primarily formed, without previous inflammation of the joint itself. But the presence of this morbid secretion in the blood may have excited inflammatory action of the synovial membrane, rapidly passing into the suppurative stage. In most of such cases, the parts containing the pus have been found eroded, and have presented other changes usually consequent upon inflammation, even when vascular injection has been absent. The question is, whether such changes have taken place previously or subsequently to the secretion of pus in the joint? That the more advanced of them are consequent upon the production of this fluid may be admitted; but that inflammatory injection and action preceded, and quickly produced, the purulent collection, seems most probable.

13. *c. Cartilaginous concretions*, which have grown from the inner or expanded surface of the synovial membrane, by necked appendages, and been subsequently broken off, are occasionally found in the cavities of joints, either entirely loose, or attached to them by thin threads. They are at first soft, then mostly cartilaginous, sometimes partly cartilaginous and bony; more rarely altogether bone; usually rounded, but occasionally

flattened or angular; and varying much as to size and number. LIEUTAUD has adduced instances of *quicksilver* having been found in the cavities of joints; but such occurrences must have been rare, and are now never observed. (See art. PERIOSTEUM.)

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Exfoliation of Tendons may occur in whitlooe, or during suppuration from punctured or poisoned wounds, as in dissection, &c. I have seen three such instances. *Fungus hamatodes* seated in fibrous parts is not rare.

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FLATULENCY.—*ΣΥΝΘΥΡΑ, ΘΥΡΝ. Flatusitas; Flatus; Flatulentia; Aëriofluxus*, Sauvages. *Pneumatosis Ventriculi, et Pn. Enterica*, J. P. Frank. *Pneumatosis*, Chomel. *Limosis Flatus*, Good. *Flatusité*, Fr. *Die Blähung, Windigkeit*, Germ. *Flato*, Ital.

CLASSIF.—1. Class, Disease of the Digestive Function; 1. Order, Affecting the Digestive Canal (Good). I. CLASS, I. ORDER (Author, in Preface).

1. DEFIN. An undue formation and accumulation of air in the stomach or intestines, with frequent rejection of it.

2. It is of some importance to ascertain the source of the flatus which is often formed so abundantly in the digestive canal. JOHN HUNTER first supposed that air is sometimes exhaled from

the blood by the vessels of secreting surfaces; and, if we view merely the results of the experiments of M. EDWARDS upon respiration, and the absorption and exhalation of various gases, by the lungs, in connection with the secretion of air into the swimming-bladder of fishes, this opinion will appear not ill-founded, even independently of the support it derives from pathological observation. In such cases we have reason to infer that it is not air, as it exists in the surrounding atmosphere, that is thus exhaled, but its constituent gases. The experiments performed by MM. GÉRARDIN, MACENDIE, and CHEVREUL have thrown much light upon the question as to the source of the gases found in the digestive canal, as well as upon their composition; and have shown, that they are partly exhaled from the digestive mucous surface.—It would appear, from the researches of these writers, that they consist, in the stomach, of nearly three parts in four of azote, the fourth part being oxygen and carbonic acid; and, in the intestines, of carbonic acid, azote, carburetted hydrogen, and hydrogen, in various proportions. It may, therefore, be inferred that the air which collects in the digestive canal is derived from three sources: 1st. From the common air swallowed with the food;—2d. From the changes or decomposition of the ingesta, and of the contents of the canal generally;—and, 3d. From the occasional exhalation of gaseous fluids from the mucous surface during certain states of local and constitutional disorder. The oxygen found in the stomach, amounting to eleven parts in a hundred, is most probably derived from the first of these sources. It is, however, either absorbed from this situation, or combines with other substances, as none is found beyond the pylorus. The azote and carbonic acid may be attributed partly to the last source; whilst a portion of both, and the whole of the hydrogen and its compounds, may be assigned to the second.—The air, which is generated so rapidly, and eructated so frequently, during acute inflammatory diseases, particularly in gastritis, hepatitis, &c., must be exhaled from the irritated mucous surface, inasmuch as there is no other source existing in such circumstances to which it can be attributed, especially when the constant vomitings, and frequent evacuations from the bowels, have left nothing in the *prima via* capable of furnishing the enormous quantity of air which is often ejected.

3. Flatulency, since the time of CULLEN, has been very generally viewed as a symptom of dyspepsia and of other diseases. But I agree with SAUVAGES, GOOD, and several other writers, in considering it to be occasionally a primary disorder. Whether it be idiopathic or symptomatic, its phenomena, and the disorders consequent upon it, are different according to the part of the alimentary canal in which the flatus is generated or confined. I shall, therefore, treat of this affection, first, as respects the stomach and oesophagus—*Flatulentia ventriculi*; and, secondly, with reference to the intestines—*Flatulentia Intestinorum*. But although it may be seated in either the stomach or the bowels more particularly, it very frequently exists in both at the same time.

4. I. FLATULENCY OF THE STOMACH will be considered at this place—(a) in respect of its idiopathic occurrence; (b) as a symptom of other disorders; and (c) with reference to the disturbances

it tends either to induce or to aggravate.—*A.* *Primary or idiopathic flatulency of the stomach* is met with chiefly when the stomach is empty, or after the process of digestion in this viscus is completed; and is seldom associated either with impaired appetite, or diminished powers of digestion. It is most troublesome in the morning before breakfast, or during long fasting; or when an unusually protracted period has elapsed between meals. In such cases, the flatus often rises into the œsophagus, producing much uneasiness and often distress, owing to its excretion being prevented by the spasmodic constriction of the upper part of this tube. In swallowing also the more solid ingesta, the bolus meets the flatus in the œsophagus, and is interrupted or impeded in its passage to the stomach. In such circumstances, a conflict sometimes arises between the descending ingesta and the ascending flatus, and a very painful *spasmodic dysphagia* is thereby induced, until the eructation of air gives relief and allows the transit of the bolus into the stomach. In this form of the disorder, the air most probably is exhaled, at least in great part, from the internal surface of the organ. In other respects the patient's health is not deranged, and the functions of digestion, defecation, and assimilation are regularly and perfectly performed. In other instances, slight defect of organic nervous power, owing to sexual indulgences, or to sedentary occupations, is the only pathological state to which this affection can be imputed.

5. *B.* The *remote causes* of flatulency are the nervous and hypochondriacal temperaments; and all the influences and habits which depress or exhaust the energy of the organic nervous system, or lower the tone of the digestive canal, especially sedentary occupations; excessive mental exertion and anxiety; venereal indulgences; intemperance in eating and drinking; the ingestion of cold fluids, particularly when the body is overheated; exposure to a cold air, or to cold in any way, whilst the stomach is empty, or whilst fasting; neglect of the functions of the bowels; the use of bulky or flatulent vegetables, or of fruits prone to undergo fermentation, especially cucumbers, melons, salads, &c.; irregularities of diet; and previous or existing disease.—Fast eating, and imperfect mastication, often give rise to flatulency, by the quantity of air which is generally swallowed on such occasions, and by the imperfect or slow digestion which usually results.

6. *C.* *Symptomatic flatulency of the stomach* is extremely common.—(a) It is almost a constant attendant upon *indigestion*; and (b) often accompanies general *debility*.—(c) It is also frequent in *hypochondriasis* and *melancholia*; (d) and in the numerous forms of *hysteria*. In this last, the flatus often rises into the œsophagus; and whilst the reaction of the coats of the stomach propels it into this tube, spasmodic constriction of the part just below the pharynx confines it for a time, and causes a distressing feeling of suffocation, &c.—(e) Flatulency is an almost constant symptom of *inflammatory and organic affections* of the stomach.—(f) It generally ushers in an attack of *gout*;—and (g) it both precedes and attends *asthmatic affections*.—(h) It is a common phenomenon of all the functional, inflammatory, and organic diseases of the liver; and is very characteristic of accumulations of bile in the gall

ducts and gall-bladder; and of *torpor of the biliary organs*.—(i) It often, also, occurs in the *functional and inflammatory disorders of the bowels*, and sometimes in affections of the other abdominal viscera.—(k) It not infrequently even accompanies *chronic diseases of the brain*;—(l) and the *adynamic and malignant forms of fever*.

7. *D.* The phenomena usually characteristic of flatulency vary somewhat with the diseases of which it is a symptom. In the course of digestion, flatus escapes with or without noise, and often with an acid, bitter, nidorous, or fœtid odour. Sometimes it is without either odour or taste; and at other times it retains the smell and flavour of the ingesta. When constriction of the cardia, or of the lower part of the œsophagus, prevents eructations, or when the coats of the stomach are so weakened, or so over-distended, as to be incapable of reacting sufficiently, *tympanitic* fulness of the epigastrium and hypochondria, with a painful sense of distension, or severe *gastrodynia*, frequent respiration, and heavy pain or oppression in the lower parts of the chest, are generally complained of. If eructations occur, especially for some hours after a full meal, acid or rancid matters, or portions of undigested food, are frequently regurgitated at the same time, and impress the palate and pharynx with an acid and irritating sensation, or produce an unpleasant, dry cough, by affecting the epiglottis and larynx. Cardialgia is then often associated with this symptom, or precedes the eructations. When flatulency precedes or attends organic lesions of the stomach, or obstructions of the liver or pancreas, the symptoms caused by, and associated with, it are often severe. Disordered action of the heart, anxiety, hiccup, *gastrodynia*, &c. being not uncommonly observed.

8. *E.* The disorders induced or aggravated by flatulency of the stomach, are various in different habits and constitutions. When the stomach is much distended by flatus, and especially when the œsophagus admits and retains for a time the air in its lower part, the feeling of oppression, dull pain, and the other symptoms just mentioned, are much increased. The actions of the diaphragm are impeded, and the regularity of the circulation through the cavities of the heart is interrupted by the pressure of the over-distended organs. Hence the intermissions and irregularities of the pulse, the sense of anxiety, flutterings, feeling of suffocation, and palpitations, so often associated with, or consequent upon, affections of the digestive organs. WHITT attributes *incubus* to flatulency of the stomach, and, I believe, very justly. In delicate, nervous, and hysterical females, various symptomatic disorders, besides those now stated to arise directly from this cause, are often experienced. The modes of dress, particularly the very strait corsets used by this sex, aggravate the disorders consequent upon flatulent distension.—Severe pains of the left side, congestions of the lungs, or of the brain, headaches, convulsions, faintness, vertigo, and several anomalous complaints, often thus originate, not only in females, but also in males, especially those who are sedentary, hypochondriacal, and debilitated. In this class of persons more particularly, the pressure of the distended stomach prevents the due action of the bowels, and either impedes or interrupts the passage of fœcal matters from

the cæcum, along the transverse arch of the colon. — Thus costiveness, and functional disorders of the cæcum and large bowels are occasioned, and are often followed, by displacement of parts of the colon, and by inflammatory and organic lesions.—It is obvious, that an aggravation of disorder will be occasioned by flatulence, where any of these affections already exist.

9. *F. Infants* are very liable to flatulence, particularly when their natural food is taken too greedily, or when it disagrees and becomes acid on the stomach. In some cases, a portion of air may be swallowed by sucking; but, however occasioned, the eructations that occur are often accompanied by the regurgitation of a considerable portion of the ingesta. Flatulence is, however, most distressing and injurious when it affects infants brought up without their natural sustenance, or during the period of weaning. In them, acidity of the prima via, watery diarrhoea, or costiveness, or both alternately, morbid offensive evacuations with severe griping pains, and emaciation, terminating not infrequently in marasmus and mesenteric disease, are often observed.

10. II. FLATULENCE OF THE INTESTINES may be either *primary* or *idiopathic*, or *symptomatic*, but most frequently the latter.—*A.* The *primary form* of intestinal flatulence is evidently itself but a symptom, if we trace the disorder up to its origin, or but one of the various phenomena resulting from debility of the digestive canal—from deficient energy of the ganglionic nervous system. In this form, however, the flatus is either expelled from time to time, *per anum*, or accumulates and gives rise to borborygmi, or to tympanitic distension of the abdomen; but these symptoms seldom become very urgent in this state of the disorder, unless some other affection supervenes. The bowels are generally costive, sometimes irregular; and the secretions poured into the digestive canal, both from its own surface and from the collative organs, are deficient, and occasionally even morbid; the flatulence and imperfect functions of these parts being the almost coëtaneous effects of the impaired influence of the organic nervous system. The air which collects in this part of the digestive tube is to be ascribed chiefly to alterations of its contents, and to exhalation from the mucous surface.—This form of flatulence may continue long without any other material disorder, excepting slight debility, want of activity, costiveness, &c.; and it may occasion, in a short time, some one of the various serious diseases about to be noticed.

11. *B. Symptomatic intestinal flatulence* is a common complaint. It is a frequent result of *costiveness*, or imperfect digestion in the bowels, particularly in the duodenum and cæcum; and of a deficient or morbid secretion from the intestinal mucous surface, and from the liver. When the quantity of air collected is great, colicky symptoms, obstinate constipation, and irregular action, or atony, of the muscular fibres of the intestines, are the usual consequences. The coats being unable to contract regularly, or sufficiently to expel the air, or obstructions being opposed to the ejection of it, various effects of a serious kind often result. Portions of the bowels react with much violence upon the distending cause, whilst other portions are distended until the contractile power of the muscular coat is almost or altogether lost.

Thus, spasmodic constriction in one part, and paralytic distension in another, are produced; and the organic sensibility of the nerves of the canal are remarkably excited or altered. Flatulent *colic* is the consequence; and, if this be not relieved, intus-susceptious, ileus, or inflammation of a portion of the bowel, may ultimately supervene. If, in addition to imperfect or morbid secretion, the tone of the muscular coat is still further reduced—when its power of reacting upon the collection of flatus is lost more generally or completely, *meteorismus* or *tympanitis* will be produced, and the abdomen will be tense, painful, or tender, and the faecal evacuations either altogether suspended, or interrupted, and hard or scybalous.

12. Intestinal flatulence is a most common symptom in *hysteria*, and is in it generally indicated by borborygmi, in *inflammations of the bowels*, in *dysentery*, in functional and organic affections of the cæcum, in *hepatic disorders*, especially *bilious colic*, in the *colic from lead*, and in the bowel complaints of *children*. It is very frequently met with in the advanced stages of *typhoid fevers*; and, as I have shown, it is one of the indications of extreme adynamia with predominant affection of the bowels. HIPPOCRATES remarks (*Coac. Prenot.* l. i. 46.), that inflation of the abdomen, without rejection of the flatus, is a dangerous sign; and the accuracy of the opinion must be admitted. In low fevers, the accumulation of air is often extremely great; and whilst it is an indication of danger, it tends to increase it, by impeding the functions of respiration and circulation, as well as by exhausting the vital tone of the intestines.

13. *C. Inflation of the bowels*, particularly of the *colon*, gives rise to various symptomatic disorders, when it reaches a considerable height; and it not infrequently occasions the same affections as arise from flatulence of the stomach. Respiration and circulation are both often deranged by this cause; and congestions of the veins and sinuses of the brain consecutively induced. Hence vertigo and headachs often follow a sense of oppression in the chest, and irregularity of the heart's action. Hypochondriacal and hysterical symptoms are always aggravated by collections of flatus in the bowels; and these latter are favoured by costiveness. Hence the advantages resulting in these diseases from the use of stomachic or tonic aperients.—The colon may be also partially displaced, and adjoining parts injuriously pressed upon by collections of flatus in the large bowels.

14. III. Although flatulency very often is limited to either the stomach or bowels, presenting the pathological relations just explained, yet it also frequently extends almost simultaneously to both, or affects one or other more or less prominently. In this case, the effects produced by it will vary accordingly, and depend upon the degree in which it exists.—Flatus, moreover, is generated in other situations, as in the *uterus*, in the *urinary bladder*, and even in the *shut cavities*, but in very rare instances, particularly as respects the latter of these. In these parts, it is either exhaled from the vessels furnishing the secretions poured out on their internal surfaces, or developed in consequence of the changes which these secretions undergo during their retention. The form

ation of air in serous cavities is never, I believe, observed, excepting as a result of inflammatory action in some part of their surface that has given rise to a secretion of a sero-albuminous fluid; and it is not improbable that the air is produced by the partial decomposition of the albuminous portion of the secretion. These occurrences are more particularly noticed in other places.

15. V. TREATMENT. — A. In the primary states of the disorder, attention to diet, and gentle tonics, with mild aperients, will generally restore the healthy functions of the stomach and intestines in a short time. If much distress be experienced from the retention of the flatus, the addition of a *carminative* spirit or oil, as those of anise-seed, pimenta, nutmeg, or cardamoms, to the above, will give relief; but the frequent use of heating spices may be injurious in other circumstances, particularly if the complaint depend upon chronic inflammatory action of the digestive mucous surface, as is frequently the case. The practice of rejecting the air, either upwards or downwards, should not be indulged in, for, although momentary relief is thereby obtained, an increased disposition to generate it is produced, and the evil augmented. It is only when air collects to the extent of producing much disorder, that its expulsion should be procured. — In this case, any of the numerous carminatives in common use may be given, if they be not contra-indicated by the presence of inflammation. In some such instances, however, the more energetic of them may be exhibited with advantage in enemata. The extract of *rue*, or any of the *essential oils*, may be thus prescribed. — HUFELAND and others advise warm dry aromatic *epithems* to be applied over the abdomen in these cases; and THUSNERG recommends the *cajuput oil* to be rubbed upon this part, or to be given internally, when the state of the circulation and of the animal heat indicates the propriety of exhibiting carminatives. — *Choracoul*, as suggested by J. P. FRANK, and *magnesia*, if not the most efficacious, are among the safest means that can be used. The same may be said of *camphor*, and the *terebinthinates*, and the plants which owe their efficacy to either of these principles. The *subnitrate of bismuth* is often of great service, particularly when conjoined with small doses of *ipecacuanha* and *hyoscyamus*.

16. Whenever flatulency of the stomach or bowels is unconnected with inflammatory action—when the pulse is soft or weak, or not increased in frequency, when the abdomen and hypochondria are not painful on pressure, when the tongue is moist, or pale, and not red at its edges, and when there is no unusual thirst—then carminatives, antispasmodics, stimulants, and tonics, combined with one another, and with absorbents and aperients, will give relief; and they may be either given by the mouth, or administered in enemata. — But even in these cases, our chief dependence should be placed upon suitable tonics, with the use of the cold salt-water bath, and attention to the secretions and excretions, for the cure of the complaint. — If an attentive view of the case suggests the existence of inflammatory irritation in any part of the alimentary canal, the *nitrate of potash*, and the *subcarbonate of soda* or of potash, with *demulcents* or *emollients*, and weak camphor mixture, will be most appropriate. In these cases, external *derivatives*, gentle frictions

of the abdominal surface with warm *rubefacient liniments*, as recommended by WHYTT, the application of hot terebinthinate embrocations or epithems, or fomentations as used by DARWIN, will be of great service. When the complaint is connected either with slight inflammatory action, or with imperfect secretion, especially of bile; or with both, as observed in numerous instances; *deobstruents*, and *mild purgatives*, will be required. In such cases, the blue pill, or PLUMMER'S pill, or the hydrargyrum cum creta, ought to be given at bedtime, with soap, *ipecacuanha*, and taraxacum.

17. B. Flatulency in infants or young children ought to be treated chiefly by appropriate food and regimen, and by mild purgatives. *Magnesia* in dill-water, or in fennel-water, or in anise-seed water, will frequently give relief; but an alterative, as the hydrargyrum cum creta, will generally be required on alternate nights. The warm or tepid bath, followed by frictions of the abdomen with some warm liniment; enemata with a little common salt, and some carminative water; and an occasional dose of castor oil, with warm clothing, and pure dry air, will also be productive of benefit.

18. C. In the more decidedly symptomatic states of the complaint, the treatment should be chiefly directed to the disease on which it depends. But in these states it is generally most urgent, and hence requires the adoption of means calculated to procure immediate relief. If those already described, employed according to the peculiarities of the case, prove inefficacious, it has been recommended by REICH, PAMARD, THILLOW, and PIONRY, to draw off, or to facilitate the escape of, the flatus, by a siphon, or by the introduction of a flexible hollow tube into the rectum. In most instances of difficulty, I have found the terebinthates with aperients, enemata with either spirits of turpentine or extract of rue, and terebinthinate embrocations or liniments applied to the abdomen, succeed in procuring the expulsion of the flatus, by exciting the action of the muscular fibres of the canal. — When this complaint depends chiefly upon debility, and is associated with other disorders proceeding from this source, the means advised in the articles COLIC, COSTIVENESS, and DEBILITY, according as it may present more or less of the features of either, should be prescribed; and diet and regimen ought to receive due attention.

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FŒTUS — DISEASES OF THE.

CLASSIF. — GENERAL PATHOLOGY.

1. The *fœtus* is liable to a greater number of diseases than has generally been supposed. Some of these, together with the lesions of the foetal appendages, have been noticed in the article ABORTION, § 10. As these diseases occasion various malformations, congenital alterations, abortions, or even the death of the *fœtus*, a brief enumeration of them will be useful in various points of view, but particularly as indicative of the sources, in which several maladies of infancy originate.

2. i. The *Causes of foetal disease* are, as respects the *mother*—violent or prolonged mental emotions; imperfect or unwholesome nourishment; excessive fullness or deficiency of blood; a morbid state of this fluid, produced by food, medicines, or disease; alt-ratives, as mercury, &c., in large doses, or too long continued; attempts at procuring abortion; the use of strait corsets; injuries, falls, or blows on the abdomen; a cachectic state of constitution, particularly the syphilitic and scrofulous taints; constitutional or other diseases, as eruptive, periodic, or continued fevers, tubercular consumption, &c.; venereal excesses during pregnancy; a laborious life, or inordinate physical exertion, and previous lesions of the ovaria, uterus, or foetal appendages. The chief causes as respects the father, are, predisposing only, with the exception of the syphilitic or scrofulous taints. There is every reason to believe that, if the father is aged, or debilitated, or suffering from constitutional or local disorder, associated with sexual exhaustion, at the period when impregnation is effected, the *fœtus* will be weakly formed, and thereby predisposed to disease, especially when the mother is exposed, during utero-gestation, to the more energetic causes, or to those just enumerated.

3. ii. The *Diseases* observed in the *fœtus*, either consequent upon one or more of the above causes, or occurring without any assignable cause, are—1st. *As respects the cerebro-spinal system*—effusions of fluid in the ventricles, or in the spinal canal, or between the membranes, giving rise to hydrocephalus, spina bifida, imperfect or arrested formation of portions of the brain or spinal cord, to inflammatory congestion of the membranes, or of portions of the brain or cerebellum (LOBSTEIN), with spasmodic contractions of the limbs, &c.; — 2d. *As regards the thoracic viscera*—inflammation and suppuration of the thymus gland (VÉRON); tubercles in the lungs, in the early stages (BILLARD, LANGSTAFF, and myself), and in a state of softening (HUSSON); inflammation of the substance of the lungs, and of the pleura; dropsy of the pleural cavities; hydro-pericardium, and malformations of the heart; — 3d. *As respects the abdominal viscera* inflammation, and even ulceration, of the internal surface of various parts of the alimentary canal; tubercles in the liver (HOOKEVEN, HUSSON), in the mesentery (OEHLER), and in the spleen (BILLARD); inflammations of the liver (BRACHER, VÉRON), of one supra-renal capsule (ANDRAL), of the peritoneum (DESORMEAUX, VÉRON), of the small intestines (BIL-

LARD); dropsy of the peritoneal cavity in various degrees (DUOËS); enlargement of the mesenteric glands; accretions of the peritoneum, and of several viscera, from chronic inflammation (ANDRY, and myself); retention of urine, and excessive distension of the bladder, ureters, and pelves of the kidneys, from obstructions to the discharge of it in the liquor amnii (SANDIFORT, MOREAU, PH. PINEL, A. COOPER, CHAUSSIER, DUCËS, &c.); rupture of the bladder (DUCËS); lesions of the kidneys, and other parts of the urinary apparatus (RUYSCH, HOFFMANN, WRISEBERG, VROLIK, BOLTSCHLER, DENIS, BOIVIN, &c.); and obliterations of canals, and occlusions of their outlets, as of those of the alimentary canal, and of the urinary and generative organs; — 4th. *As respects the general frame*—intermittent fevers, small-pox (DEUTTEL, &c.), and other eruptive fevers (ANDRY); syphilis, and jaundice (HEY, ANDRY, BAUMES, &c.); — and, 5th. *As regards external parts*—malformation of the palate, mouth, and lips; dislocation of various joints, and even of the hip joint (DUPUYTREN, CHAUSSIER, NORTH); contractions of muscles; fractures, gangrene, &c. of the limbs (JOERO); hardening of the cellular tissue (UZEMBREZIUS, MAURICEAU, STRATFORD, &c.); anasarca, and œdema of one or more limbs (GARDIEN, DUCËS, ANDRY, &c.); hydrocele (ANDRY); various tumours and nævi; and several affections of the skin (GOECKEL, LEDEL, OEHLER, CHAUSSIER, ANDRY, &c.).

4. My limits prevent me from remarking upon these; but it may be mentioned, that MAURICEAU was born with the small-pox; and that jaundice may arise in the *fœtus*—1st, from the same causes as induce it in the adult; and, 2dly, from jaundice in the mother. M. DUCËS mentions that a lady was subject, during pregnancy, to colic and jaundice from biliary calculi; and, in four instances, the children were born deeply jaundiced. I attended, some years since, a lady in tubercular consumption, who was delivered, in the seventh month, of an emaciated and very small *fœtus*, that died a few days afterwards. On examination, the lungs were found loaded with tubercles, and the mesenteric glands enlarged. M. TONNELÉ found an enormous fungoid tumour (*fungus hæmatodes*) on the right side of the head of a *fœtus*; and M. VOISIN, a polypus adhering to the posterior part of the palate.—The existence of worms in the bowels of the *fœtus* has been asserted by some writers, and denied by others. The evidence is not sufficiently conclusive either one way or another.

5. iii. The *Death of the Fœtus* may take place from the greater number of these diseases, or from lesions of the placenta, umbilical cord, or membranes (see ABORTION, § 10.). Although there are numerous exceptions to the rule, the more vigorous the *fœtus*, the stronger and more lively will be the sensations of its movements. It is evident that the existence, and far less the nature, of the foetal malady cannot be ascertained before delivery; yet, in some instances, it may be suspected, from what is known of the causes. An attack of ague in the *fœtus* is usually made manifest to the mother; but does not generally cause abortion. The feebleness and slowness of the foetal movements, after the fifth month, are indications of impaired strength of the *fœtus*, which should not be overlooked. The total cessation of

motion; a feeling of uncomfortable weight gravitating to the side on which the patient lies, and of general uneasiness and coldness in the lower part of the abdomen; flaccidity of the abdominal parietes subsequent to a certain degree of tension; fever of the breath, pallor of the countenance, lividity of the eyelids or surrounding circle, and flaccidity of the breasts; generally denote the death of the fœtus; and when the pulsation of the heart cannot be heard on auscultation, this event may be inferred with certainty.

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FUNGOID DISEASE.—**SYN.** *Hæmato-cerebriform Disease*; *Milt-like Tumour*, *Monro*. *Soft Cancer*, *Auct. var.* *Spongoid Inflammation*, *Burns*. *Medullary Sarcoma*, *Abernethy*. *Carcinoma spongiosum*, *Young*. *Fungus Hæmatodes*, *Hey*, *Wardrop*. *Fungoid Disease*, *A. Cooper*. *Fungus Medullaris*, *Mauclair*. *Matière cérébriforme*, *Auct. Gall.* *Carcinome mou* et *Spongieux*, *Roux*. *Tumeur Encéphaloïde*, *Laennec*. *Fungus Mdullaire*, *Lobstein*. *Carcinus Spongiosus*, *M. Good*. *Carcinome Sanglante*, *Cancer mou*, *Fr.* *Der Blutschwamm*, *Germ.* *Bleeding Fungus*.

CLASSIF.—3. *Class*, *Sanguineous Diseases*;

4. *Order*, *Cachexies (Good)*. IV. *CLASS*,
IV. *ORDER (Author, in Preface)*.

1. **DEFIN.**—A tumour, or tumours, consisting of a whitish, pulpy, brain-like substance; generally soft, circumscribed, elastic, or obscurely fluctuating; giving rise to large vascular growths, which bleed profusely; always connected with constitutional vice; contaminating the frame, and terminating fatally.

2. **i. DESCRIPTION.**—This is the most malignant formation to which the body is liable. When it appears covered only by the integuments, and has not yet acquired considerable bulk, the surface of the tumour which it forms is smooth, generally equal, and not discoloured; it is commonly soft and elastic, and communicates to the touch an obscure sense of fluctuation. When removed from the body, the hæmatoid tumour is generally circumscribed, and more or less rounded; it frequently possesses a capsule of condensed cellular membrane.—A. M. LAENNEC has divided the disease into, 1st, the encysted; 2dly, the irregular and non-encysted; to which he has added, 3dly, the interstitial impregnation of organs by the cerebriform substance. This last is not mentioned by Mr. WARDROP, who has described this disease

with great accuracy. M. LAENNEC has never met with it in the lungs. It may be, therefore, considered as a rare form of the disease. When divided, the substance soils the knife, and is composed of an opaque, whitish, homogenous matter, resembling, in colour and consistence, the cerebral pulp. Hence the name, *Encephaloid*, given by the French pathologists. It softens after exposure for a short time to the atmosphere; and when the softer part is washed away, or when the mass is compressed, a filamentous or fine cellular tissue remains.

3. **B.** The consistence of the hæmatoid tumour varies in different cases, and sometimes in different parts of the same mass—being sometimes more dense than the firmest brain, at other times as soft as the brain of a fœtus, as the milt of a fish, or even not much firmer than custard. According to M. LOBSTEIN, the different degrees of softening is owing to the progress of the disease; and this appears to be generally the case. In the first stage, or that of crudity, the melanoid tumour has the consistence of a firm brain, or of the conglobate glands; in the second, the consistence is less, being that of the foetal brain; in the third, it approaches that of milt or custard: to these may be added a fourth, when the tumour is situated externally, or near the surface of an organ or part, viz. that attended with ulceration and the rapid production of bleeding fungi from the ulcerated part.

4. **C.** The colour of this production varies sometimes in the same mass. It is commonly of the colour of the brain; occasionally portions of it are redder, and exhibit more of a fleshy appearance; and in other cases, parts of it resemble a clot of blood. When the hæmatoid mass is encysted, it is readily detached from its capsule; and, in the early stage, is often divided into several lobes, placed closely together, and separated by an extremely fine cellular tissue, which seems to convey the vessels for its nutrition. In the advanced stages, the division into lobes disappears. The non-encysted form is, however, more common, particularly in the viscera. The masses constituting this formation vary from the size of a pea to that of the head of a fœtus at the full time.

5. **D.** The medullary structure, although the general, is not the only, form observed in the primarily diseased mass. Some of the fungoid productions are composed of distinct parts provided with cellular capsules, and differing in size, colour, and consistence. Some of these parts resemble slightly softened glue; others have earthy particles mixed with the pulpy cerebriform matter; many present insulated portions of the colour and consistence of boiled yolk of egg. As the tumour increases, the softening and disorganisation characterising the successive stages of its growth takes place. Disorganisation generally commences in the central parts: cavities now form in it, chiefly containing blood; and, when the blood is washed away, and the tumour is placed in water, numerous membranous shreds and filaments are seen floating in these cavities.

6. If the fungoid mass is situate near the surface of any internal viscus, discolouration of, and adhesion to, the part covering it, followed by ulceration, take place. But the ulcerative process, instead of giving rise to loss of substance, produces a fungous growth, and, as well as when the tumour forms exteriorly, the increase of bulk, which had hitherto been slow, now becomes rapid.

The fungus which thus forms is soft, easily torn, of a dark red or purple colour, of an irregular shape, and bleeds profusely when slightly injured; and differs from the firm dense structure of the cancerous fungus. It resembles, when small, the softer kinds of polypous vegetations which form on mucous surfaces. — When the primary hæmatoid tumours are situated towards the surface of the body, they increase in size more rapidly than when seated internally. They generally soon lose their uniform round and smooth appearance; they project very considerably, and at last become irregular at their surface. Their consistence diminishes, particularly in the projecting portions, where the soft elasticity passes into obscure fluctuation. The veins running over or from the diseased mass assume a varicose appearance; an erysipelatous-like redness of the prominent parts supervenes, followed by lividity, adhesion of the integuments to the tumour, ulceration, and soft reddish fungous excrescences. The growth of the tumour is now remarkably rapid. The surface of the fungi exudes a thin fetid sanies, often with blood, which is sometimes discharged in great quantity; hence arose the name fungus hæmatodes, which applies only to the advanced stage of the malady. When the fungus is very large, its more prominent parts often lose their vitality, and separate in most offensive sloughs.

7. In some cases, the voluntary nerves have been connected with the diseased mass, and have participated in the change of structure; but they have not been found changed beyond the limits of the tumour. In the eye, the optic nerve is always changed in structure; and in a case referred to by Mr. Wardrop, the anterior crural nerve passed into the centre of the diseased mass, and was so completely lost in it, that it was impossible to distinguish between the two structures. This appearance being general whenever large nerves enter into the hæmatoid tumour, has led M. MAUNOIR to infer that the cerebriform matter composing it is nothing else than a morbid accumulation of the nervous pulp. This opinion is combated by M. LOBSTEIN, who avers that he has met with cases in which, particularly in early stages of the disease, the nerves passed through the tumour without experiencing any change. I am, however, disposed to doubt this, at least as respects the fully developed disease: if they pass *through*, I believe, from the dissection of a case which occurred to me, that they are always changed, and identified with the morbid mass: if they pass merely *by* it, or between insulated portions of it, no change will be observed.

8. The most remarkable characteristics of this disease are, 1st, The frequently simultaneous occurrence of a number of the tumours constituting it in different parts of the body; the least connected with each other, either by structure or function: and, 2d, That when an apparently isolated mass of the disease is met with in an extremity and extirpated, it always soon afterwards manifests itself in some distant part, either externally or internally; the subsequent disease being even more rapid in its progress than that preceding it. The simultaneous appearance of the hæmatoid tumours, or their successive manifestation, although sometimes observed to take place in the course of the absorbent system, seem not to be always propagated through this medium; for in

the case of the diseased mass appearing first in one of the lower extremities, the subsequent occurrence of it may not be in the glands above the originally affected part, but in some distant or internal organ, as in the lungs, liver, in an upper extremity, &c. This was well evinced in a most remarkable specimen of the disease which came before me several years since in a lad of about fifteen; who presented in all the extremities, upper and lower, in the parietes of the thorax and abdomen, in his neck and head, a number of those tumours, certainly not under fifty. They varied from the size of a walnut to that of a large orange; many of them were of simultaneous origin, and those which were the latest in appearing did not occur in the seat of the glands of the absorbents leading from the primary tumours. A somewhat similar, and still more remarkable case, in respect of the great extent and number of the tumours, both internal and external, I had lately an opportunity of seeing frequently with Mr. BUSHELL.

9. Often, however, when the original mass is advancing through the changes I have described, the absorbent glands become affected by the disease, and the internal viscera and the whole constitution are contaminated; or, perhaps, it would be more correct to say that the original contamination is thereby so far heightened as to occasion a more general formation of this diseased structure. When the absorbent system is affected, Mr. WARDROP states, that usually one or more glands swell in the vicinity of the primary tumour, and that this takes place sometimes at an early period of the disease, and occasionally not until the primary tumour is far advanced. In some cases the diseased glands grow to a great size, whilst in others they are but slightly enlarged. Occasionally the primary affection makes little progress, whilst the disease of the glands advances rapidly. — The structure of the glands thus secondarily affected is entirely converted into the cerebriform matter, exhibits a homogeneous pulpy mass, and is contained in a cellular capsule. Mr. WARDROP has never observed a fungus arise from the diseased gland.

10. This morbid production may appear in one part only, or in several at the same time, or in distant parts successively. The tumours which first appear may be called *primary*; those which occur afterwards, either in the absorbent glands or in remote parts, may be named *consecutive*. But the disease may terminate fatally without any more than a single mass being developed. Mr. LANGSTAFF has adduced an instance of this. The primary tumour may be small, and the subsequent productions most extensive, or the reverse.

11. There is scarcely any organ or part of the body exempt from this disease. The extremities, the mamma, thyroid gland, the testes, ovaria, uterus, the lungs, the liver, pancreas, spleen, the stomach, the intestines, the urinary bladder, prostate gland, the mesentery, omentum, the eye, the brain, the spinal cord, the nerves, the glands, the heart, the muscular parts of the trunk, the bones, &c., have all been found affected with this malignant disease. It seems to commence in the cellular tissue; but, as it is developed, the proper texture of parts to which it extends is either converted into it, or is absorbed in proportion as it is increased.

12. *ii. PROGRESS AND DURATION.* — *a. The*

progress of the disease may be divided into four stages.—In the *first*, the tumour has the consistence of the conglobate glands; in the *second*, it is much softer; in the *third*, the softening is still greater, and amounts to a state of semi-liquefaction, and gives the sensation of fluctuation; in the *fourth*, ulceration or vascular fungi arise.—Signs of general cachexy appear in the second or third stage, and are very decided in the fourth.—*b.* The duration of this malady is generally some months at least; and it may continue for two or three years. In the early stages, it is not usually attended by febrile action, or much pain; and it may exist for a considerable time without occasioning emaciation; but there is always more or less debility. Acceleration of pulse, and emaciation, appear in the advanced stages, often accompanied with effusion into the adjoining cavities, particularly when an internal organ is the seat of the malady, as the liver, uterus, &c.—In the *third* and *fourth* stages, the vital functions are very manifestly affected. The stomach loses its power, or rejects the ingesta. The patient experiences most severe pain; and the energies of life decline. The complexion often assumes a livid, earthy, or peculiar yellowish hue, or pale straw colour; the pulse becomes smaller and weaker; and at last the patient sinks, generally without either delirium or insensibility having existed for any considerable time before death.

13. iii. **DIAGNOSIS AND COMPLICATIONS.**—This disease was confounded with cancer until the commencement of this century, when BURNS and HAY first remarked the difference between them. They are still considered by some Continental pathologists, and by Dr. CARSWELL, as varieties or modifications of the same constitutional malady; and there are several circumstances which both favour and militate against this opinion. They both occur in similar habits of body and temperaments; they often arise spontaneously, or without any manifest cause, or are traced to the same exciting agents; they are both dependent upon constitutional vice, as well as upon perverted organic action and secretion in their seats; and they both undergo somewhat similar local changes, and occasion an increasing contamination of the fluids and soft solids. Moreover, as I have stated in another place (see article DISEASE, § 141—144.), and as Drs. KERR and CARSWELL have justly remarked, both may co-exist, or the carcinomatous may pass into the fungoid formation. Dr. CARSWELL observes, that numerous examples might be given of scirrhus, medullary sarcoma, and fungus hæmatodes, as they are commonly called, originating in the same morbid state, and passing successively from the one into the other in the order in which they have been named. Indeed, these varieties are sometimes met with, not only in different organs of the same individual, but even in the same organ.

14. The points, however, of dissimilarity are very striking, as remarked in the article referred to (§ 141—144.); and, notwithstanding these circumstances, are sufficient to constitute them distinct diseases. As these points have not been brought into view by the able writers just mentioned, and as they deserve a fuller notice than I have bestowed on them in the sketch indicated above, I shall here state them more fully.—*a.* There is no relation between the hard, incom-

pressible texture of scirrhus, in which carcinoma commences, and the cerebriform, elastic, and soft substance constituting fungoid disease.—*b.* Carcinoma commences in scirrhus, which confounds in one mass all the tissues which it invades, and often without much increase of bulk, although with augmented density; fungoid disease always consists of a more or less evident tumour, which seems to destroy every trace of any other structure.—*c.* Carcinoma, even in an advanced stage, when fungous projections sprout from its ulcerated parts, presents but little vascularity; whereas the fungoid disease possesses large vessels, and vascular cavities, so that it derives one of its most common names from this circumstance.—*d.* Fungoid disease attacks organs in which true carcinoma has not hitherto been seen to originate; as the lungs, the liver, the brain, the spinal cord, and the nervous trunks.—*e.* Cancer affects the aged, fungoid disease the young; and the former is attended with more pain at the commencement than the latter:—and, *f.* as, MM. MAUNOIR, LOBSTEIN, and VESPEAU have remarked, there is something peculiar in the cachexy attending carcinoma, that is not observed in the fungoid malady; for it is not unusual to see persons, labouring under this latter affection, possessing their natural colour. This, I believe, occurs most frequently when some external part only is affected, or when the disease has not invaded the digestive or assimilating organs, or, when absorption of the morbid matter has not taken place to a great amount. In a case now under my care, the healthy complexion is preserved, and yet neither the able practitioners who have seen it, nor myself, have any doubt as to its nature.

15. M. LOBSTEIN asks, with reference to the question of the identity of these two maladies, whether, admitting that true cancer sometimes gives rise to the fungoid formation, it therefore follows that this latter is the same as cancer? May there not exist, simultaneously, tuberculous degeneration of the lungs, fungoid disease of the liver, and fibrous tumours in the womb, without inferring the identity of these three morbid formations? Fungoid disease, therefore, appears, from its vascular relations, from its peculiar structure, and from its early characters, its advanced course and terminations, to be a distinct malady, although it may be consequent upon, or complicated with, other alterations of structure. When it occurs in young subjects, it is always *primary*, or is not preceded nor attended by the carcinomatous formation. But in persons past the meridian of life, in whom only scirrho-cancer or carcinoma is met with, the fungoid structure is sometimes produced *consecutively*, or in an advanced stage of it, and thus occasionally exists as a secondary complication with that disease, or as one of the advanced changes of structure consequent upon the constitutional vice. The question, therefore, as to difference is reduced to this, that, when fungoid disease attacks young persons, it is always a primary and distinct malady; and that, when it affects persons advanced in life, it is either primary, or consecutive of, and complicated with, carcinoma (see art. DISEASE, § 141—144.). In a few instances, other morbid formations besides this have been found associated with the cerebriform structure, as fibrous tumours, scrofulous

matters pus, melanosis, hydatids, osseous and earthy deposits, &c.*

16. iv. CAUSES.—a. The *predisposing causes* of fungoid disease are debility of constitution, early age, and peculiarity of diathesis. Children, and persons who have not passed the meridian of life, are much more frequently affected by it than persons in the decline of life. Those of the lymphatic and nervous temperaments, of a scrofulous constitution, of a sallow or pale complexion, and of a lax fibre, with a flabby state of the soft solids, and languid circulation, are oftenest its subjects. As to the influence of sex, sufficient data have not been furnished to admit of an opinion; but the most of several cases which I have seen have occurred in males. The same may be said of the influence of climate; but, like cancer, it seems to

be most prevalent in countries the inhabitants of which partake largely of animal food. It has even been supposed that eating much pork predisposes to it. An hereditary disposition to it may be admitted with more truth. General debility is, however, its most common antecedent.—b. The *exciting causes* are often unknown. Sometimes an external injury, as a blow or bruise, has occasioned it, often after a long period. Most of the cases which I have seen appeared to have arisen chiefly from a poor and unwholesome diet, aided by cold and moisture.

17. v. The *Prognosis* is extremely unfavourable. If the malady is developed so as to admit of precise recognition, a fatal issue may be delayed a short time by a tonic or restorative treatment, but can never be averted. Extirpation, or amputation, has been attempted, but with no benefit, and often with disadvantage. Although the diseased part be removed in this way, its source is still in the constitution, and it soon afterwards is developed in some other situation, generally in an internal viscus, the nearest to the seat of the extirpated part. If it exist also in an internal organ, the shock occasioned by the operation accelerates its growth and fatal progress.

*Besides the distinctions I have insisted upon above, SCARPA and BERARD have added others, which I may here notice at length. The cerebriform or fungoid structure, when fully developed, is a milk-white pulpy substance, studded with rose-coloured points—scirrhous-cancer has the appearance of the skin of brawn, and is traversed by numerous cellulo-fibrous radii or bands. The former comprises a number of arterial vessels, that increase with the softening which it undergoes; extravasations of blood take place in its substance; and the ulceration of its advanced stage is accompanied with hemorrhage, which is often repeated, and frequently profuse;—the latter is nearly deprived of vessels; sanguineous extravasation is seldom observed in it; and the ulceration to which it gives rise is rarely attended by any considerable hemorrhage. The cerebriform substance is often found in the veins of the diseased part—sometimes nearly filling them—and occasionally, also, in those in the vicinity;—a similar circumstance is very seldom observed in scirrhous-cancer. The cerebriform disease attacks primarily all the systems, tissues, and organs of the body; the primary seat of carcinoma is much more limited. The former attains a great size, is lobulated, and presents a characteristic elasticity and softness;—the latter never reaches a great size, it even sometimes assumes the appearance of diminished bulk, with increased density, and has neither a rounded outline nor elasticity.—Fungoid tumours frequently co-exist, even primarily, in several organs—occasionally in considerable numbers;—carcinoma is generally solitary. The cerebriform disease softens into a rose-coloured *bovillie*; scirrhous assumes the form of a *jelly*. In their progress to the surface, the first stretches the skin, and renders it thinner; without adhering to it; the second cements itself to the integuments, which no longer admit of motion, but is firmly attached to the diseased mass. The progress of ulceration in this is remarkably slow; in that very rapid. In the one, the period which elapses from the commencement of ulceration is often as long or longer than that which preceded this change; in the other, the period subsequent to ulceration is disproportionately short, and the lesions consequent upon it are of a much more acute and violent character, though the pain may be less.

It is in the early stage, or state of crudity, that these two maladies are distinguished from each other with greatest difficulty. The fungoid structure has not then attained the white colour it subsequently acquires. It is at first semi-transparent, firm, and divided into numerous lobules. Its vascularity is also not so great as at an advanced stage. But, although it thus resembles scirrhous, to conclude from this, that they are identical diseases, is to admit that the same lesion will give rise to two kinds of structure that essentially differ. But this stage of fungoid disease is very short; and in cases where a number of tumours are developed in different parts of the body, they all have the same cerebriform structure. Malignant disease may, however, present the *complicated states* above mentioned; the same tumour consisting partly of the carcinomatous and partly of the cerebriform structure. In addition to these, it may even comprise other morbid products, disseminated through it, or collected in one or more places—in one part an adventitious fibrous tissue, in another a fibro-cartilaginous formation, in a third tubercular matter, in a fourth multilocular cysts containing various substances—here a gelatinous secretion, there a milky fluid, this a reddish or bloody matter, that an osseous or a cretaceous deposit. These, as well as the cerebriform products thus accidentally or occasionally comprised in carcinomatous or malignant tumours, are not the constituents of carcinoma, but contingent formations consequent upon the morbid nutrition and secretion constituting the local dis-

18. vi. ORIGIN.—Many writers on this disease, and especially the French pathologists, suppose that the diathesis in which the disease originates is connected with the cancerous taint; and that the fungoid is only an advanced stage, or higher grade of carcinoma. M. MAUNOIR and LOBSTEIN are opposed to this view; and my opinion, as just stated, coincides with theirs. Although both diseases are distinct as to the *kind* of action, as to the form of the morbid structure that results, and as to some of the circumstances in which it takes place, yet the *manner* in which they both arise may not be different; their morbid actions being similar in some respects, but different in others. Hence the alliance occasionally observed between them; as in other diseases generally connected, but specifically different. The opinion, therefore, which I have stated as to the origin of CANCER (§ 25, 26.), and the remarks there offered, are, in part, applicable to this disease.—Dr. HODGKIN has endeavoured to show that fungus hæmatodes and carcinoma originate in a cystiform serous membrane. That they thus arise in some instances may be admitted; but I agree with Dr. CARSWELL in the opinion that they are often formed independently, and where cysts cannot be detected; and that, even where cysts have existed, their formation in the cellular tissue external to the cysts has been demonstrated.—The views of M. ANDRAL have been stated in the article just referred to, and in that on DISEASE (§ 138.). M. CRUVEILHIER believes that this, as well as some other lesions, are the results of the deposition of morbid products in the cellular tissue of organs, the venous capillary system furnishing these products.

19. Dr. CARSWELL is of opinion that the formation of the fungoid and carcinomatous substance takes place in the blood, whether it be found in this fluid alone or in other parts of the body at the same time; and he adduces the facts—1st, That the morbid substance is found in the vessels which ramify in these malignant tumours, or in their vicinity;—2dly, That it is found in those vessels which communicate with the diseased part of an

organ;—and, 3dly, That it is met with in vessels having no direct communication with an organ affected with the same disease. The veins, however, and venous capillaries, are the only parts of the vascular system in which the diseased substance is found—sometimes in contact with the internal surface of the vein, or occasionally united with it by means of thin colourless fibrine, or even of very minute blood-vessels, as in the case of the cerebriform matter. In the articles referred to, I have stated that, when this morbid substance is detected in the blood, it has been absorbed, as in the case of other morbid secretions; and the accuracy of the opinion seems to be supported by the fact, that it is found only in the veins and absorbents; but Dr. CARSWELL believes that this is not the case, as there are instances in which the venous blood alone was the seat of the disease. If such be actually the case, an obvious difficulty presents itself; but various sources of deception arise in the course of minute researches, and mislead even the most careful. That the blood is early affected in this and other malignant diseases, I fully believe; but that the cerebriform matter is formed in it, and afterwards deposited in the parts which are its seats, cannot be supported by the history and progress of the local and constitutional affections. If it were previously formed in the blood, wherefore is it often deposited only in one situation?—wherefore is it not excreted by the emunctories?—wherefore does it not always affect a number of parts simultaneously?—wherefore is it never found in the arteries, and so frequently in the absorbents and veins proceeding from the seat of disease?—These, and other questions that may be asked, cannot be answered consistently with this doctrine. I therefore entertain the same opinion as was stated by me in the articles already referred to, and believe that, like carcinoma, it essentially depends upon a debilitated and otherwise morbid state of the system generally; and that the vital actions of the part or parts primarily and especially affected are depraved—that the nutrition, organic sensibility, and the secreting function of these parts are remarkably altered, and that the morbid product which results is partially absorbed into the circulation, and contaminates the fluids and soft solids, sometimes exciting a similar morbid action in other situations.

20. Conformably with the best ascertained facts connected with the appearance of the cerebriform matter in the vessels, it would seem, that, at a somewhat advanced stage of the disease, or when this structure becomes more or less softened, the molecules of it pass into the veins and absorbents leading from the part in which they have been formed; that they there sometimes are aggregated into masses sufficiently large to admit of their recognition; that, although these masses are generally found merely in contact with the internal surface of the veins, they sometimes adhere to it by means of the fibrine which collects around them, as in every other instance in which a semifluid or partially concrete substance, or a secreted matter of greater consistence than the blood, passes into the circulation; and that, when they thus adhere to the internal surface of the veins, minute vessels are ultimately developed in the fibrinous envelope which has been formed around them.—The principal changes observed

in the blood of those affected by this disease, and which I have had an opportunity of remarking in two cases after death, are, an unusual thinness—a deficiency of fibrine and red particles—a state of partial anæmia—and imperfect coagulation. This state has been also remarked by BÉCLARD, VEIJEAU, ANDRAL, and KERR, whose observations respecting the presence of the cerebriform matter, surrounded by a fibrinous envelope, in the venous blood, fully confirm the view I have taken of its origin in this situation, and militate against its primary formation in this fluid. (See articles CANCER, § 26.; and DISEASE, § 141.)

21. vii. TREATMENT.—This is a subject on which much cannot be said with any hope of advantage. Surgical treatment is of no avail, and strictly medical means of very little more. Whatever excites pain, or irritates the local disease, tends to promote its growth; and whatever lowers constitutional power, only lays the system more open to contamination. The intentions, therefore, which we should propose to ourselves, when entering upon the treatment of this malady, are—1st, to support the powers of life, and thereby to resist as long as possible the extension of the disease;—2dly, to promote the secretions and excretions, as auxiliary to the first indication;—and, 3dly, to palliate the sufferings of the patient.

22. A. The first of these is founded upon the evident and admitted fact that the disease is dependent upon, and associated with, debility; and upon the results of observation; and the means which may be employed to fulfil it need not be materially different from those specified in the article CANCER (§ 29. *et seq.*). Although no medicine has hitherto proved successful in curing the malady, yet new remedies, or novel combinations of those that are old, should nevertheless be directed against it. Besides, judicious means have often prolonged life, or enabled the system to resist its progress for a time. Conformably with these views, the preparations of cinchona; the sulphate of quinine; the preparations and compounds of iron, particularly the ferrum ammoniatum, and the muriated tincture; sarsaparilla; bitter tonic infusions or decoctions, with liquor potassæ, or the alkaline subcarbonates; and the preparations of iodine,—may be severally used, and combined with some one of the more energetic narcotics, particularly the acetate or muriate of morphine, or conium, or belladonna, or aconitum.—The preparations of iodine are the most successful of any means I have employed, in resisting the progress of this morbid formation. The ioduret or iodide of iron, and the hydriodate of potash, should be selected, and taken internally in small or moderate doses. The external use of iodine is often injurious. In a case of this disease, affecting chiefly the stomach and some others of the abdominal viscera, lately under my care, a combination of the acetate of morphine and kréosote palliated the urgent symptoms after other means had failed. In the still more recent case of a lady from Wales, who came to town on account of malignant disease of the stomach, that probably partook of the fungoid character, from the size of the tumour and other symptoms, this combination proved serviceable. This lady had been treated with great discrimination by Mr. SERPH of Welshpool. During her stay in London, the acetate of morphine in a dilute aro-

matic spirit always afforded relief; but, when the disease had advanced further, and after her return home, it had but little effect. Mr. SZARU therefore, at my request, gave her the following during the paroxysms of suffering, with great benefit. —

No. 227. R. Morphine Acetatis gr. ij.; Kréosite M xij.; Pulv. Glycyrrh. et Pulv. Acacie, aa q. s. ut fiat massa equalis, quam divide in Pil. xij. Capiat unam, omni hora, urgenti dolore.

23. When the diseased part appears about to ulcerate, and afterwards especially, it should be protected from external injury or irritation; and if the bleeding from it be copious, or the discharge offensive, a solution of kréosite in weak pyroligneous acid or spirits of turpentine will prove the most efficient styptic and corrigent. The chloride of lime may likewise be employed. In addition to the other tonics just enumerated, the chlorate of potash may be tried in the decoction of cinchona. If iodine be prescribed, it should be continued for a long time. The hydriodate may be given in the compound decoction of sarsaparilla; with conium, aconitum, or any other narcotic, if much pain be felt. During the course of treatment, the secretions and excretions should be regularly promoted; and if the bowels be sluggish, their actions ought to be promoted by a tonic or stomachic aperient repeated according to circumstances. The other means, which have been recommended in the article CANCER (which see) are equally appropriate in this, and other malignant formations.

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FURUNCULAR ERUPTIONS. — SYN. *Furuncular Inflammations*; *Furuncles*; *Furunculi*; *Furunculus*, Sauvages. *Phyma*, Willan Good. *Phylis furunculosa*, Young.

CLASSIF. — 3. Class, 2. Order (Good).

Order, 1. Genus (Willan). IV. CLASS IV. ORDER (Author).

1. DEFIN. — *Inflammation of the cellular apices penetrating the reticular texture of the corion arising from disorder of the digestive organs, and modified in character by the state of constitutional power, and the condition of the circulating fluids.*

2. The true skin or corion is penetrated by small conical prolongations derived from the cellular tissue underneath. With these, the vessel and nerves proceed to the superficies of the corion to form the papillar tissue and vascular rete.

When inflammation commences in one or more of these prolongations, furunculus or boil, horleolum or sty, and anthrax or carbuncle, are the results; but in these, the surrounding true skin, with the subjacent cellular tissue, participate to a greater or less extent with the progress of inflammation. M. RAYER remarks, that, left to themselves, these affections always terminate in the mortification, and subsequent expulsion of one or more of the small cellular cones of the dermal tissue, which are then designated by the title of *cores*. This termination is generally ascribed to the resistance offered by the fibrous corion to the expansion of the cone of inflamed cellular tissue, and to the consequent strangulation of it; but the *cores* are probably the condensed tissue surrounding the matter which is formed in the inflamed tumour, and which is browned off after this matter is discharged. It is even possible, that the inflammation in this affection commences in the vessels themselves which accompany the cellular elongations or cones; and that the disease is actually a limited angitis, or arteritis, of one small branch, the cellular substance sloughing in consequence of its supply of blood being cut off, from an impervious state of some of the minute ramifications.

3. The varieties of furuncle are generally dependent upon disordered states of the digestive functions, and the characters which they assume vary with the states of vital action and of the circulating fluids. When furuncle occurs in a tolerably sound constitution, and healthy condition of the blood, it assumes a *sthenic* character, and constitutes *furunculus* or the *common boil*, or *sty* when it is seated in the eyelid. But, when it affects the aged or debilitated, or previously diseased, or the cachectic, or those in whom the circulating fluids are impure, and the vital actions languid or imperfect, it puts on an *asthenic* form, and gives rise to two varieties; one of which has been noticed only by M. GUERSENT and myself, and which may be called *Asthenic Furuncle*; the other has been usually named *Anthrax* or *Carbuncle*.

I. STHENIC FURUNCLE. — *Boil*; *Furuncle*; *Phyma Furunculosa*, Good; *Furuncle*, Clou, Fr.; *Die Beule*, Germ.

4. This species is characterised by small inflammatory swelling of the skin and subjacent cellular tissue; this swelling being circumscribed, conical, hard, red, hot, and painful; and terminating in the formation of a small quantity of matter, and the expulsion of dead cellular tissue.

5. i. Symptoms. — This affection begins in a small, hard tumour, most frequently seated on the hips, buttocks, thighs, back, nape of the neck, and armpits. The tumour becomes conical, painful, of a vivid or violet red colour, and reaches, in a few days, the size of a large walnut. From the fifth, to the eighth day, it points, the apex becoming white and soft. It soon afterwards breaks, and discharges a little sanguineous pus, the outer part of the slough being exposed through the small opening. The core or slough is generally expelled two or three days afterwards, and the pain then ceases, the swelling subsides, the cavity left by the core fills up, and, in a few days, the opening closes, a cicatrix only remaining. One boil is often followed by others, which follow a similar course, and attain various sizes. They

may succeed one another more or less rapidly; but they are seldom attended by fever, unless they are large or numerous. When they form in the perinæum, or near the anus, difficulty of voiding urine is often felt. In other situations, they may affect the lymphatics proceeding from their seats, and the adjoining glands.

6. ii. *Causes*. — The application of blisters, frictions with irritating liniments or ointments, inattention to personal cleanliness, the use of sulphureous or alkaline baths, and various antecedent or associated affections, are the usual causes of this eruption. Furuncle is often consequent upon the decline of, or convalescence from, fevers, the exanthemata, and inflammatory disease of the skin; and it often seems to depend upon weakness, or chronic inflammatory irritation, of the digestive organs; or upon accumulation of sordes in the *prima via*. In some cases, however, it occurs without appreciable antecedent disorder.

7. iii. *Treatment*. — But little is required for this complaint beyond attention to the digestive organs. Accumulations of mucous sordes and faecal matters ought to be freely evacuated by an aperient consisting of equal parts of the compound infusions of gentian and senna with a neutral salt or alkaline subcarbonate. A bread and water poultice, or any other soothing and relaxing application, may be kept on the part. If the boil be large, and the pain considerable, the division of the skin, at the most prominent part, will be of service. When a succession of boils appears, an emetic may be given, and its operation promoted by the infusion of chamomile flowers. The above stomachic aperient may be afterwards continued daily, or on alternate days. If the eruption still appears from time to time, gentle tonics may be prescribed. Dr. FOSBROOK recommends large doses of sulphuric acid. Mr. COPLAND HUTCHISON informed me, that he found the liquor potassæ, or Brandish's alkaline solution, in any bitter tonic infusion, most beneficial in these cases. The extract of taraxacum may be added to a mixture or draught of this kind, and an alternative pill given at bedtime, and continued for some days.

8. II. HORDEOLUM — *Stye*; *Phyma Hordeolum*, Good; *Sclerophthalmia, σκληροφθαλμία*; *Orgeolet*, Fr.; *Gerstenhorn*, Germ. — is a small inflammatory tumour or boil in the free edge of the eyelids, most frequently near the inner angle of the eye. — It is in every respect a similar affection to furuncle, the difference arising entirely from the nature of its seat. It is seldom larger than a grain of barley, and is generally smaller, as its name indicates. — Its causes, progress, and treatment are in all respects the same as those of common boil. — This, and the preceding variety of furuncle, are most common in young persons, just before or soon after puberty, and in adults who eat largely and take much spirituous liquors. — In scrofulous constitutions, and persons addicted to intemperance, they assume a chronic form. In such cases, local applications with camphor are of service.

9. III. ASTHENIC FURUNCLE — *Atonic Furuncle*; *Furuncle Atonique*, GUERSENT — consists of a small circumscribed swelling of the skin, in one or several situations, with or without livid discolouration; followed by a very small purulent phlyctæna, at the summit, and by softening, destruction, and large perforation of the corion under-

neath; and preceded and attended by much debility and low fever.

10. This affection was described by M. GUERSENT, in 1823; and early in the same year I saw two cases of it, with Mr. PAINTER, in a low street and ill-ventilated apartment in Westminster. Both occurred in unhealthy children in the same family, and terminated fatally. The bodies were inspected after death. Since then I have seen only three other cases, but I have met with others somewhat similar, consequent on the application of leeches. — All the instances which have occurred in my practice, as well as those seen by M. GUERSENT, were in children much weakened by previous disease; or in those affected by gastro-intestinal irritation, or by chronic disorder of the bronchi, or asthenic inflammation of the substance of the lungs. There have always been, both before and after the appearance of this eruption, well-marked symptoms of adynamia; and coma has generally come on before death.

11. i. *Description*. — This eruption appears chiefly on the trunk, the lateral parts of the neck, and insides of the thighs. In the cases which I have seen, the number of furuncles was considerable — not fewer than five or six; and, in two cases, there were about twenty. They commence in small, circumscribed, and hard swellings, of a livid tint, but sometimes nearly colourless. At a further advanced stage, very small purulent phlyctæna appear in their summits, that break, and leave the skin underneath of a greyish colour, softened, and perforated as in common furunculi. They discharge at first a serous, sanguineous, or ichorous fluid. The tumours soften and disappear; and the perforations of the corion enlarge rapidly, producing, in two or three days, holes in the integuments, varying from three or four, to six or seven, or even eight or nine, lines in diameter. These perforations are perfectly round; their margins are not elevated, nor thickened, nor injected; and they entirely resemble the holes made by a drill or auger. The cellular tissue is not thrown off in the form of a core, but is destroyed by a rapid ulceration, or phagedenic absorption. The bottoms of the ulcers have a greyish or sanious appearance, and are nearly dry. There is no discharge from them, nor have they any tendency to scab; and the perforations of the integuments frequently proceed down to the muscles, or aponeuroses, the peculiar structure of which may often be seen at their bottoms. The skin forming their margins is pale and somewhat softened, and the cellular tissue immediately beneath the cutaneous margins is often destroyed to the extent of one or two lines. — In the variety of asthenic furuncle following the bites of leeches in cachectic and debilitated children, which is the most common, the perforations of the skin are at first triangular, but their progress is nearly the same as that of the spontaneous variety, and as they enlarge they become entirely circular. The ulceration attending upon the advanced stage of disease is seldom very painful. Having reached the extent just described, it remains stationary for a longer or shorter time, and in the more unfavourable cases shows no disposition to reparation. When it evinces a disposition to heal, the bottom is more moist, somewhat redder, and more vivid; the perforated margins of the skin become more closely connected with the subjacent tissues,

granulations arise and elevate the bottom of the ulcer, and the perforation is lessened. Thus a depressed cicatrix is formed, as in other cases where the skin has been destroyed.

12. In the two cases, in which I had the opportunity of seeing the appearances after death no attempts at reparation were visible in the ulcerated perforations, which went down to the muscles, as if the part had been removed by an auge. There was no injection or inflammatory appearances in the margins. The chief alterations were moderate emaciation, congestion, and injection of the membranes of the brain, with slight serous effusion; congestion of the substance of the lungs, with limited hepatization in an early grade patches of injection in the digestive mucous membrane, other parts being pale; and enlargement of the mesenteric glands. M. GUENSEN has not mentioned the internal lesions he may have observed; but those just noticed throw no much light upon the affection, and are of frequent occurrence after other diseases. In most of the cases I have treated, there has been low nervous fever, with more or less manifest affection of the gastro-intestinal surface, or of the head or lungs. The perforations are always uniform in character although varying somewhat in size; they are peculiar; and are hardly ever modified from the state above described. They appear analogous to the perforating phagedenic or atonic ulcers sometimes seen in the stomach.

13. iii. *Treatment*.—The means of cure should necessarily be directed chiefly to the constitutional disorder. This should be removed, by the preparations of cinchona; by the sulphate of quinine; by the mineral or vegetable acids; by camphor or ammonia; by the decoction of bark with nitre, and spirits of nitric ether; by the infusion of valerian or cascarrilla with the chlorate of potash, or chloride of ammonia, and chloric ether, by camphor julep with the chloro-sodaic solution; or by similar remedies, aided by means calculated to relieve internal complications, as alteratives, external derivatives, and mild stomachic purgatives. Neither leeches nor blisters should be applied, as the former are liable to multiply the perforating ulcers, and the latter are apt to produce sphacelation. The semicupium, however, with much salt and mustard in the bath, may be used. Removal to a dry, healthy atmosphere, or to the sea-side, or to an elevated situation, and light nourishment, are also beneficial. The most efficacious local applications are, the solutions of the chlorurets of soda or lime, kreosote, the dilute acids, pyroligneous acid with camphor and kreosote, poultices of powdered bark, with spirits of turpentine, and the balsams and terebinthines, especially Peruvian balsam, or equal parts of it, or of copaiba, and of turpentine.

III. CARBUNCLE.—*Ανθραξ*, Hippocrates; *Anthrax*; *Carbo*; *Perisicus Ignis*; *Carbunculus*, Celsus; *Phyma Anthrax*, Good; *Charbon*, Fr.; *Karbunkel*, Germ.; *Furuncular Anthrax*.

14. Carbuncle appears in the form of a hard, painful, circumscribed tumour of a deep red colour, with a sensation of burning heat, terminating in gangrene. M. RAYER states that it is an acute inflammation affecting simultaneously several of the contiguous cellular cones penetrating the reticulations of the true skin. It is not improbable that the vessels themselves, particularly the arteries,

are more or less implicated in the inflammation.

15. i. *Progress*.—Anthrax occurs most frequently in the nape of the neck, or above the nape, on the back, shoulders, buttocks, thighs, and sides of the trunk. It often commences in a small tumour, of a few lines in diameter, the apex of which is sometimes covered with a sanguinolent vesicle. In other cases it is much larger from the beginning, and it then generally advances with greater rapidity. As it spreads, so it becomes more prominent and penetrates more deeply; and, in seven or eight days, it is often as many inches in diameter. Its colour deepens to a violet or bluish tint, and it is hard throughout, until the cellular tissue of the central parts passes into gangrene. Its base afterwards continues to spread, the circumference remains hard, and the centre softens, and fluctuates very obscurely. The heat is still burning, the pain is tensile, and both are now referred chiefly to the base of the tumour. When left to itself, the skin covering the anthrax becomes thin and soft after some days, and is perforated in several places. It then discharges a little bloody pus, or ichorous matter with small shreds of mortified cellular tissue. It occasionally sphacelates to a much greater extent, and its surface becomes dark, black, and insensible. For some days afterwards, new perforations are formed, through which whitish sloughs of cellular substance are passed. The openings enlarge or run into each other; give passage to a thick sanguinolent matter; and sometimes emit a foetid odour. The sloughs are at length detached, the discharge increases and becomes thinner, and the pain and heat diminish. When the destruction of the integuments is considerable, the superficial fascia are often denuded, eroded, and even perforated—the surrounding skin being livid, bluish, thinned, and partially detached from the parts underneath. If a favourable change in the part takes place, granulations appear; and a cicatrix, which is always irregular, depressed, and puckered, and continues long dark, or brownish red, is formed, partly by the ulcerated surface, and partly by the union with it of the loose flaps of skin.

16. The constitutional symptoms are generally severe, and often precede the local lesion. Indeed, anthrax rarely occurs excepting in habits of body evincing more or less cachexy, with sanguineous plethora, and disorder of the digestive functions. For some days before its eruption, the patient complains of anorexia and increased disorder of these functions, and of lassitude, chills, or shiverings. With the development of the tumour, the febrile commotion increases, and presents the usual concomitants of inflammatory fever. If sphacelation takes place, or if the ulceration is protracted, the attendant fever assumes gradually an adynamic character; and in delicate, old, or very cachectic persons, it is nervous or adynamic from the commencement.

17. Various internal affections may also be implicated with the external disease. Congestions or inflammations of the liver or of a portion of the lungs, enlargement of the spleen, and gastro-intestinal disorders, are the most frequent associated complaints. When anthrax is seated in the neck, cerebral symptoms are often present. If it occur in the lateral or anterior parts of the neck, dyspnoea, cough, headach, and even serious

affections of the larynx or trachea, are experienced. If it take place in the parietes of the chest, the most severe pleuritic and pulmonary symptoms sometimes supervene, from the extension of the inflammation internally to the pleura, and thence even to the lungs. When it attacks the abdominal parietes, peritonitis has even occurred in a similar manner. Anthrax may also be associated with some other external eruption, especially with the common furuncle, which may either precede or accompany it.

18. ii. *Causes*.—Anthrax is most common in spring and summer, according to M. RAYEN. It is certainly most frequent in persons past the meridian of life, and in females about the total cessation of the menses. High, rich, or gross living, with insufficient exercise, and a full, gross habit of body, predispose to it, and even more directly produce it.—Causes which derange the digestive and biliary functions, the application of acid or stimulating matters to the skin, neglect of personal cleanliness, and the bites of insects, most commonly excite it. It is often a sequela of small-pox, measles, and typhoid fevers; and it is a commod attendant upon plague, and sometimes even appears in the latter stages of the putro-adyamic form of typhoid fever.

19. iii. *Diagnosis*.—Carbuncle is to be distinguished from the common boil, by the latter having only a single opening, and being smaller and more conical; and by several occurring in succession. The former, on the contrary, is broader, less acuminated, is perforated by several openings, is darker, and more gangrenous, and is generally single when occurring as an idiopathic disorder. According to DUPUYTREN and RAYEN, however, anthrax is a tumour formed by the conglomeration and confluence of several furuncles. Carbuncle has very generally been confounded with malignant pustule, or anthracion. The latter belongs to a different order of affections of the skin; and is described, as well as distinguished from anthrax, in the article PUSTULES.

20. iv. *Treatment*.—This should be commenced with the exhibition of an emetic, the operation of which may be promoted by a tepid infusion of chamomile flowers. A full dose of calomel and James's powder, should afterwards be given, and the free action of the bowels promoted by purgatives. Whenever the pulse is strong, full, or hard, bloodletting; according to the age and habit of the patient, is requisite, particularly early in the disease. Leeches ought also to be applied around the base of the tumour, and the bleeding from their bites encouraged by tepid fomentations. A repetition of the local depletions may be required even oftener than once. Diaphoretics, with tartarised antimony and opium, if the pain and burning be very severe, should afterwards be given, and the bowels kept open by the occasional exhibition of a purgative. When the attendant fever is of a low form, or when gangrene has taken place, and suppuration continued for some time, especially when the patient is aged, of a cachectic habit, or is addicted to intoxication, or is greatly debilitated, the decoction of cinchona, with the alkaline subcarbonates; the

sulphate of quinine with camphor; tonic infusions with muriatic acid, and chloric ether; and the means advised in putro-adyamic fever, should be prescribed, with light nourishment, wine, &c.

21. The local treatment should consist chiefly of refrigerant applications in an early stage of the swelling. Compresses moistened with equal parts of pyroligneous acid and rose-water, to which some camphor has been added, should be constantly applied from the commencement. They generally relieve the pain and burning heat. If the inflammation still proceeds, a crucial incision, completely across the swelling, and down to its base, as advised by DUPUYTREN and RAYEN, should be made. This will give instant relief by the loss of blood, and by removing the strangulation of the vessels and cellular tissue. It also averts gangrene, facilitates a healthy suppurative action, and hastens granulation and recovery. The actual and potential cauteries formerly advised, are now rarely employed. Several American writers recommend the application of blisters over the swelling—the discharge from the surface favouring a return of healthy action in the diseased part.

22. When anthrax is complicated with any of the internal affections indicated above (§ 17.), the treatment ought to be decided and appropriate to the morbid associations, as the progress of the complication is generally rapid, owing to the unfavourable state of constitution giving rise to this kind of local disease.—During convalescence, sulphureous baths, and the aperient sulphureous mineral waters, with strict attention to the functions of the digestive organs, and to diet and regimen, are usually productive of benefit. I have found the following medicines of service, when the patient cannot resort to suitable mineral waters.

No. 228. R. Infus. Sennæ Comp., Infus. Gentianæ. Co., aa 3vj. Sode Sub-carbon. gr. xij. Spirit. Ammon. Arom. ʒss.; Tinct. Cardamom. Co. ʒj. M. Fiat Haustus, alternis diebus sumendus.

No. 229. Potassa Supertart. in Pulv. ʒj. Sulphuris Precipitatus. ʒiij. Confect. Sennæ ʒij. Syrup. Zingiberis q. s. ut fiat Electuarium molle, cuius capiat Coch. j. minimum, horâ somni quotidie.

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ii. ASTHENIC FURUNCLE.—Guersent, in Archives Générales de Médecine, t. i. p. 336.—I find, upon reference to the London Medical Repository, for July, 1823, p. 32, that I described this eruption in the London Medical Society, at the commencement of that year; and that soon afterwards M. GUERSENT's paper respecting it appeared in the Archives. It was thus noticed, for the first time, almost simultaneously by this physician and myself.

iii. CARBUNCLE.—Celsus, l. v. sect. 26.—A. Testi, De Anthrace seu Carbunculo Tractatus, 4to. Venet. 1676.—C. P. De Herrera, De Carbunculis Animadvers. 4to. Pintia, 1604.—T. D. Mitchell, New York Med. and Phys. Journ. 1816, vol. ii. p. 64.—J. B. Beck, in Ibid. 1833, vol. ii. p. 37.—D. Hosack, Essays on Various Subjects, N. Y. 1824, vol. ii. p. 256.—A. Cooper, Lectures, 1. 1. p. 245.—Sansom, in Dict. de Méd. et Surg. Pr. t. iii. p. 26.—Marjolin, Dict. de Méd. 2d edit. Par. 1833, art. Anthrax.—Dupuytren, Leçons, Lancette Française, Mars, 1833.—Rayer, Opus cit. p. 549.—H. Coates, in Amer. Cycl. of Pract. Med. vol. ii. p. 23.—J. Green, Opus cit. p. 270.

END OF THE FIRST VOLUME.

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A DICTIONARY OF PRACTICAL MEDICINE.

GALL BLADDER AND DUCTS.—*SYN.*

Biliary Passages; Channels of the Excretion of Bile. La Vésicule et les Canaux du Fiel; Les Voies d'Excretion de la Bile, Andral. Die Gallenblasse, Die Gallengang, Geim.

CLASSIF.—GENERAL PATHOLOGY—Morbid Structure. SPECIAL PATHOLOGY.

1. The intimate connection, anatomically and physiologically, existing between the liver—the organ secreting the bile, and the digestive canal—the organ for whose functions the bile is chiefly destined, necessarily involves the passages which convey it from the former into the latter, as well as the reservoir of this secretion, in many of the diseases seated in either the one or the other. The affections of the liver, whether functional or structural, are thus often extended to the gall-bladder and ducts; and those of the stomach and duodenum not infrequently proceed in an opposite direction, to the same parts. But the bile itself may excite disease, in the parts through which it passes, and in which it is for a time retained. It will, however, be necessary to take a view of the alterations observed of this secretion, before noticing the effect they sometimes produce in the biliary passages.

I. OF THE ALTERATIONS OF THE BILE

2. The changes of the bile have been found independent of any alteration in the liver, or in the gall-bladder or ducts; and, in most of the lesions of these parts, the bile has been unaltered in appearance, or in quantity, and most probably also in quality. It would seem, therefore, that the most apparent and the most serious lesions of the liver, are not always those which most derange the secreting action of this organ. The conditions which most affect the state of this fluid are such as are either beyond our powers of observation, or seated in the blood. Indeed, there is every reason to suppose that the liver performs, as I many years ago argued in another work, an eliminating function as respects the blood; and that it separates elements from this source, which would be injurious if allowed to accumulate, and elaborates them into a secretion necessary to digestion and assimilation. Alterations in the quality and quantity of the bile, therefore, in a great measure depend upon the blood, and upon the quantity of those constituents which the liver eliminates from this fluid and elaborates into this peculiar secretion.

3. *A.* The only alterations which can be detected in the bile upon simple inspection, are differences in colour and in consistence.—*a.* It presents every shade of colour, from a whitish pale straw

colour, to the deepest black. The lightest tints have been most frequently observed in cases of anæmia, or chlorosis, or, where the blood has been thin, watery, pale, or devoid of red particles—the liver being small, pale, and containing little blood. The dark colour is most common where the blood is thick, dark, or black, and abundant; and when the liver is congested, and the biliary passages loaded with bile.—*b.* The consistence of this secretion varies from the fluidity of water, to the thickness of half-melted glue, or of tar, or even of pitch. The deeper its colour, the greater is its consistence; but there are numerous exceptions to this.

4. *B.* Chemical analysis shows that the constituents of the bile vary greatly in their proportions. As the liver approaches more completely to the fatty condition, the more entirely is the bile deprived of its resinous elements. It sometimes, particularly in cases of fatty liver, consists chiefly or almost entirely of water and albumen. In other instances, the yellow matter, the resin, or the cholesterine is the predominant principle. It is this change in the proportions of the component parts of the bile that gives rise to its consistence, as well as to Biliary Concretions (see that article).

5. *C.* Physiological experiments, and various diseases, evince material alterations in the qualities of the bile. This secretion, taken from some dead bodies, produces no other inconvenience, when introduced into a living animal, than a slight local irritation; whilst that taken from others occasions much more serious consequences, and even death itself. In some cases it may be tasted with impunity; in others it produces pustules, ulcers, or vesications on the tongue and lips. It has been observed, in dissections of persons who have died of pestilential yellow fever (see PESTILENCE), that the bile has excited a painful or burning sensation, followed by excoriation of such parts of the examiner as had come in contact with it. A similar effect is not infrequently produced in the rectum, and around the anus, from the passage of bile which has been long retained and accumulated in the biliary passages. Numerous other proofs of an increased acrimony of this fluid, arising either from the state in which it is secreted, or from changes that have taken place in it during its retention, might be adduced, if they were required.

6. From these considerations it may be inferred—(a) that accumulations of this secretion, in either the gall-bladder or ducts, will arise from impaired contractility, or from mechanical obstruction at the outlets, or from the viscid or morbid state of the secretion itself;—(b) that the bile itself will some-

times occasion very serious disease in the gall-bladder or ducts, owing to an acrimony acquired by it in the way just stated (§ 2.);—and (c) that, when the bile is thus accumulated or retained, as well as altered in quality, the consequent disorder, either in the biliary passages, or in the digestive canal, when it has reached the latter situation, will be the more severe.—The difficulty, however, of forming a correct opinion as to the complaint, when the gall-bladder or ducts are its seats, should not be forgotten; for, owing to the relations noticed above (§ 1.), it often is impossible to distinguish disease of either the one or the other, from that of the liver or duodenum, unless the passage of bile into the intestines is altogether interrupted; and even then the exact nature and extent of lesion are equally difficult of recognition.

II. INACTION OF THE GALL-BLADDER AND DUCTS.—*Accumulation of Bile in the Gall-bladder and Ducts from local Asthenia.*

CLASSIF.—I. CLASS, I. ORDER (Author).

7. CHARACT.—*Fulness; weight, or uneasiness in the epigastrium and hypochondrium; flatulence or symptoms of dyspepsia; a pale, slightly lurid, or muddy complexion; scanty or morbid excretion of bile in the stools, frequently with debility and depression of mind.*

8. i. When the functions of the liver, or those of the stomach and duodenum, are impaired, the gall-bladder and ducts necessarily participate in the disorder; and the bile is liable to accumulate in them.—The accumulation may arise from one or more of the following conditions:—1st. Impaired tonic contractility of the coats of the gall-bladder, and perhaps also of the ducts.—2d. A congested or tumefied state of the mucous membrane at the outlet of the common duct, and in the duodenum.—3d. Inspissation of the bile in the gall-bladder and ducts, from the morbid state of the secretion, or from the absorption of its more fluid parts, whilst retained in these situations.—4th. Spasm of the ducts themselves:—and, 5th. Temporary or constant occlusion of the ducts from inflammation, or from the presence of biliary calculi, either in them or in the gall-bladder.

9. A. The first of these pathological states is of frequent occurrence, in a moderate degree. When the contractility of the coats of the biliary passages, or of the gall-bladder, is impaired, in connection with torpor of the liver, and debility of the stomach and duodenum, the bile is imperfectly excreted, or it accumulates in these situations. The consequent distension, or the irritating properties the bile acquires by the retention, or some other cause, excites the contractility of these parts, and occasions the collected secretion to be thrown into the duodenum, where it produces more or less disorder, owing to its acridity, and to the very intimate and extensive relations of this intestine with the rest of the economy. When the bile has thus accumulated, a very gentle aperient will often be the cause of a violent action on both the stomach and bowels; this secretion, particularly if rendered acrid by long retention, and by the influence of temperature or season, giving rise to all the characters of bilious cholera, when its rapid flow into the duodenum has been thus procured.

10. B. That congestion, or a tumefied condition,

of the mucous membrane of the duodenum will occasion accumulations of bile in the ducts and gall-bladder, is at least extremely probable; for the aperture of the common duct in this viscus being thereby narrowed, a diminished discharge of bile into it will result, particularly if this secretion be thicker or more viscid than natural.—In cases, therefore, of acute or chronic duodenitis, or of irritation of the internal surface of the duodenum, particularly if there also exist spasm either of this viscus or of the common duct, an impeded or interrupted flow of bile into the digestive canal, with consequent accumulation of it throughout the biliary passages, with or without jaundice, will very generally supervene. (See art. DUODENUM, § 12.)

11. C. That the bile becomes inspissated and often more acrid, by retention in any of its passages, may likewise be conceded. The fact is even demonstrated, not only by observation during the life of the patient, but also by the appearances after death. In such cases, it is with some difficulty that the secretion can be forced along the ducts, or from the gall-bladder along the cystic canal. In an inactive state of the liver, the hepatic ducts are unable to discharge the bile which passes into them; and this fluid, during its collection and retention, is liable to be partially absorbed. Owing to this absorption, or to the state of the secretion at the time of its production, or to both, inspissation, viscosity, and increased acrimony of it may take place before it passes out of the liver, or reaches the larger ducts or gall-bladder; and even concretions may form in it from the same circumstances, in any of these situations. (See art. CONCRETIONS—Biliary.)

12. D. Spasm of the common or cystic duct may give rise to retention, and be followed by the same series of changes as have been just mentioned; but the evidence of the occurrence of spasm is much less complete than that of the other pathological states. It seems, however, probable that the passage of an acrid secretion along the cystic and common ducts, will so irritate them as to give rise to spastic constriction of them. This effect is produced upon other canals by irritating matters; and it may therefore be inferred, that a similar result will accrue in this situation from the operation of these agents. That it does occasionally take place, has been demonstrated in some instances by *post mortem* inspections.—That inflammation of the ducts is often followed by accumulation of bile in the gall-bladder and hepatic ducts, will be shown hereafter; it may, however, be stated, that a persistence, or a higher grade, of the same cause—the acridity of the bile—as at sometimes occasions spasm or constriction of the ducts, will even induce inflammation of them and its consequences.—It has been often found, upon examination after death, that collections of bile have arisen from tumours, or morbid enlargements of the pancreas, pressing upon, or even obliterating, the ducts, particularly the common duct. Several instances of this kind have occurred to me in practice. That biliary concretions, in the common, the cystic, or the hepatic ducts, often produce similar effects, is a sufficiently established fact in pathology.

13. ii. The symptoms of accumulations of bile in

the gall-bladder and ducts from impaired action are — fulness and uneasiness in the epigastrium, extending to the right hypochondrium, sometimes attended by a sense of weight, distension, and of coldness in the pit of the stomach, and by pain or uneasiness about the lower angle of the shoulder blades; flatulency, oppression, or acidity of the stomach; a pale or sallow complexion; a dark circle around the eyes; a loaded, pale, or yellowish tongue; diminished clearness of the skin; a soft, slow, weak, or languid pulse; lassitude or debility; inability of exertion; constipation, colicky pains, or an irregular state of the bowels with deficiency of bile in the stools; loaded or dark urine, with a more or less copious sediment; occasionally pain in the eyes and forehead; and mental depression, with disinclination to mental or physical employment.

14. iii. *Complications.* — This complaint may be symptomatic of other affections, particularly of those already alluded to. It may also occasion various associated ailments. When arising from previous disorder of the stomach or of the intestines, or of the liver itself, the primary affection will be more or less increased by it. The associated ailments, with some of which it often stands in the relation either of cause, or of effect, are chiefly, indigestion, constipation, diarrhoea, jaundice, colic, hypochondriasis, agues, rheumatism, gout, herpetic and other cutaneous affections, enlargements of the spleen, asthmatic seizures, dropsy, and palpitations or other irregular actions of the heart. I have often had occasion to observe, that, when any of these complaints was attended by the symptoms characterising this affection, if a purgative succeeded in procuring copious bilious evacuations, a very beneficial effect speedily followed. In many of these morbid associations, a very gentle aperient has produced a very violent operation, but the result has always been most salutary. A lady was subject for some time to palpitations, intermissions of the pulse, with great uneasiness at the præcordia. Various opinions were given as to the nature of the disease. Having been consulted, I observed several of the symptoms indicating accumulations of bile on the biliary passages. A moderate dose of calomel to be taken at bed-time, and a mild purgative draught in the morning, were prescribed. Violent catharsis followed; and the disordered action of the heart disappeared. In 1822, I was requested by a practitioner to see a patient with him, labouring under a severe attack of asthma. He had been purged, but without relief. I inferred from the symptoms, that accumulations in the biliary passages had favoured the accession of the seizure; and therefore prescribed, in addition to other means, five grains of calomel, with one of ipecacuanha, and five of the extract of henbane, to be given at night; and a stomachic aperient in the morning. The former of these procured an irruption of acrid bile into the duodenum to such an amount as to occasion violent cholera; the morbid bile, in passing through the rectum, occasioning severe scalding and excoriation around the anus. — A military officer, who had suffered several attacks of ague, was seized with it in London, during an easterly wind in March. The practitioner who attended him had prescribed purgatives, and the sulphate of quinine, without benefit. I recommended a bolus

to be given at bed-time, containing twenty grains of calomel, five of James's powder, and three of camphor, in conserve of roses; a purgative draught in the morning, and persistence in the use of quinine. Before the purgative draught was taken, violent bilious purging came on, and he had no return of the ague. I could adduce, if it were requisite, numerous instances illustrative of the importance of attending to the association of the morbid state now under consideration, with other ailments. I know of no disordered condition which so generally *predisposes*, or so frequently *gives occasion*, to other and more severe diseases, as this.

15. iv. *The Remote Causes of accumulations of bile* are numerous, and not fully recognised by writers. From my own observations in this climate, as well as in warm and other countries, I believe that they will be found to be the following. — (a) *Predisposing.* — A warm, moist, low, and miasmatic climate; mental depression, anxiety, and grief; general debility, and weakness of the digestive organs; the bilious, melancholic, or phlegmatic temperaments; sedentary occupations, indolence, and confinement; insolation; too full living, and the use of too much animal food; indulgence in wine or spirituous liquors; and venereal excesses. — (b) *The exciting causes* are — the sudden or protracted abstraction of the heat of the body, especially when in an inactive state, as sleeping with too few clothes, or in a damp bed, and the ingestion of cold drinks or ices; neglect of the bowels; and agues, or previous disorder of the biliary apparatus.

16. v. *Treatment.* — The means to be employed for the removal of this disorder are so evident as scarcely to require remark. Cases, however, occur, in which some discrimination, as to the choice of medicines for the evacuation of the accumulated secretion, is necessary. In general, the milder purgatives should be first prescribed; and, if these fail, the more energetic may be employed. It often happens, particularly when the bile has become inspissated, or when the gall-bladder and ducts have had their contractility much impaired by over-distension, or by any other cause, that the repeated exhibition of chologogue purgatives is necessary. But in other cases, especially when the bile has acquired acrid qualities, the gentler means will be the least likely to produce the severe effects often following the first dose of a purgative, after the disuse of this kind of medicine for some time. Accordingly, five grains of blue pill, or of PLUMMER'S pill, may be given at bed-time, and a mild aperient draught the following morning. The evacuations should be inspected, and the repetition of these, or the selection of more active means, determined upon from the appearances they will present. If it should be necessary to repeat the purgative frequently, the mercurial ought to be given with caution, or only on each second or third night, and either of Formulæ 205, 266., or of the following, should be taken on the following morning, and on the intervening nights, until all biliary collections have been removed: —

No. 230. R. Infus. Sennæ Comp., Infus. Gentianæ Comp., ʒʒ 3ʒj; Potassæ Sulphatis ʒij — 3ss; Extracti Taraxaci 3ss — ʒij; Tinct. Cardamom. Comp. ʒjss. M. Fiat Haustus, hora somni vel primo mane sumendus.

No. 231. R. Infus. Calumbæ, Infus. Sennæ Comp., ʒʒ 3ʒjss; Sodæ Sub-carbon. gr. xv. — ʒj; Extr. Taraxaci ʒij; Tinct. Cardamom. Comp. ʒjss. M. Fiat Haustus ut supra sumendus.

No. 232. R. Potassæ Supertart. In pulv. ʒss.—ʒvj.; Confect. Sennæ ʒss.; Syrup. Zingiberis q. s. ut fiat Electuarium molle, cujus dimidium sumatur horâ somni, vel mane nocteque.

17. The above are generally sufficient to accomplish the ends in view. But sometimes they fail, although repeated, to procure a sufficient evacuation of bile, or to remove all the symptoms depending upon collections in the biliary passages. When this is the case, a full dose of calomel, with James's powder or camphor, or ipecacuanha, or with the compound cambooge pill, or the compound extract of colocynth, may be given at night; and either of these draughts, or a solution of neutral salts, in the morning. An emetic is often beneficial in such circumstances, before these measures are resorted to. When there appears reason to believe that the accumulation of bile arises from active congestion of the duodenum, particularly when the symptoms of inflammatory indigestion are present, or when the indications of spasm in the ducts seem to exist, calomel is generally necessary, and it may be repeated with advantage. The combination, also, of ipecacuanha or antimony, with the purgative taken at night, promotes the action on the biliary organs. In some obstinate cases, when it was necessary to repeat the purgatives frequently, I have given colchicum, in either of the above draughts, with benefit. Besides these, frictions with stimulating liniments over the right hypochondrium and epigastrium, or a blister, the nitro-muriatic acid lotion, or the emplastrum ammoniaci cum hydrargyro, in the same situation, may be prescribed. A healthy air, or change of air, regular exercise, particularly horse-exercise, early hours, and the use of the Cheltenham mineral waters, or the artificial mineral waters of Seidschutz or of Pullna, with attention to diet, will materially promote the action of the biliary apparatus.—The treatment is in other respects similar to that advised in the articles on CONSTIPATION AND INDIGESTION.

III. EXCESSIVE DISTENSION OF THE GALL-BLADDER.

18. i. It is not often that the accumulation of bile in the gall-bladder is so great as to give rise to an external tumour, as its discharge into the duodenum generally occurs before it reaches this extent. But cases sometimes are seen in which a very distinct tumour is formed by the distended gall-bladder, in one of the following situations:—1st, In the epigastric region and a little towards the right side;—2dly, Immediately below the cartilaginous margins of the right ribs;—3dly, Lower in the hypochondrium, and directed either downwards, or upwards, or even backwards, but most frequently rising into the epigastrium;—and, 4thly, Descending down either towards the umbilicus, or to the crest of the ilium, or between these situations.—The distension of this viscus arises—(a) from inflammation and tumefaction, or thickening, &c. of the coats of the common duct, occasioning more or less narrowing or complete obstruction of its canal;—(b) from similar lesions, or tumours, in the duodenum, implicating the termination of this duct;—(c) from the arrest of a biliary calculus in the same situation;—(d) from tumours in the pancreas, pylorus, or adjoining parts, or even in the liver itself, pressing upon the duct;—(e) From the entire obliteration of the duct, in consequence of either of the foregoing lesions;—and (f) possibly

from spasmodic constriction, or from the accumulation of thickened bile or mucus in the canal. Of these five alterations, all but the last have been observed by me in *post mortem* examinations. The last very probably has existed in some of the cases in which the tumours have disappeared with more or less rapidity.

19. The tumour, thus formed by an excessively distended gall-bladder, may—α. continue during the remaining life of the patient; β. or disappear after a longer or shorter time, its subsidence being either slow or rapid. This latter event may proceed either from the removal of the obstruction in the common duct, whether this have been spasm, inflammation, or any of the more mechanical obstacles just mentioned; or from the gradual absorption of more or less of the bile in the bladder. When absorption of the contents of this viscus proceeds, an additional quantity not passing into it, the tumour will disappear slowly and gradually. Instances have occurred, however, in which the coats of the gall-bladder, owing to the great distension, or to the acrimony of the contained fluid, have become inflamed, or ulcerated, and have subsequently been perforated or ruptured, the contents being effused, either into the peritoneal cavity, giving rise to intense and rapidly fatal peritonitis, or into some other viscus with which the gall-bladder had previously formed adhesions. Cases of this kind have been recorded by SCHENCK, BERTIN, ALBERTI, SALMUTH, DONLT, DESJARDIES, PORTAL, FRANK, DOUBLE, and PORRAL. The accumulated bile may even be poured out externally, owing to the adhesion of the gall-bladder to the abdominal parietes, and to the inflammation, ulceration, and perforation having proceeded from the former to the surface of the latter. HORSTIUS, BLOCH, AMYAND, and DE HAEN have detailed cases of this description.

20. Although calculi lodged in the common duct most frequently occasion distension of the gall-bladder, yet this cause may exist without this effect being observed; or it may have been present and have gradually subsided. M. DUPLAY (*Journ. Hebdomad.* t. iii. p. 14.) has adduced a case, in which this duct was completely obstructed by a calculus, the hepatic ducts and their radicles having been much dilated, and yet the gall-bladder was atrophied, and reduced to a simple canal with thickened parietes. Inflammation of the gall-bladder had most probably supervened in this instance, and been followed by thickening and constriction of its coats, with absorption of its contents. M. PETIT thinks that inflammatory engorgement and tumefaction of the liver is often concerned in producing accumulation of bile in the bladder; and that, when the resolution of the inflammation is followed by a copious secretion of this fluid, before the congestion or tumefaction and obstruction of the common duct have been removed, the distension of the gall-bladder will often be excessive. From whatever cause it may arise, the accumulation is often remarkable. In a case related by Mr. GIBSON (*Edin. Med. Essays*, vol. ii. p. 352.), the tumour was so large as to reach over to the left hypochondrium, to force out the false ribs of both sides, and to occasion great difficulty of breathing. The common duct was found after death obstructed by concretions, and the gall-bladder contained eight pounds of thick bile.—YOUNG (*Philos. Trans.* vol. xxvii.)

found, in the body of a middle-aged female, a similar obstruction, and nearly the same quantity of thick bile in the gall-bladder. Parallel instances, to which references are made at the end of this article, are recorded by VESALIUS, GOLDWIZ, HEUSINGER, HAUTESIERK, AMYAND, VETTER, KRAEFF, VAN SWIETEN, DOVERNEY, PEZOLD, WIEDEMANN, and others.

21. The contents of a distended gall-bladder do not always consist of bile. In rare instances, purulent matter, or numerous biliary concretions, have been collected in it.—The former has generally passed into it from an abscess in the liver, either along the ducts, or subsequent to adhesions formed between the external surfaces of the liver and gall-bladder.—MORGAGNI and FANTONI found it distended by air.

22. ii. *Diagnosis*.—A tumour arising from accumulations of bile in the gall-bladder may be mistaken for an abscess of the liver, or for encysted dropsy, or for a tumour containing hydatids; and, if an opening were made into it, in the supposition of it being either of these, a fatal result would immediately ensue, unless adhesions had previously formed between the gall-bladder and the parietes of the abdomen, which rarely take place. If, therefore, is very necessary to distinguish between these diseases and an excessive distension of the gall-bladder.—(a) The diagnosis between this latter and abscess of the liver, pointing externally, is often difficult. In a case which I had an opportunity of seeing, the surgeon was about to puncture the tumour; when delay having been suggested, and chologogue purgatives prescribed, the tumour disappeared after a copious discharge of bile. A similar case was lately reported in one of the London Medical Journals. M. PÉTRIT, having been consulted in a case that had been considered abscess of the liver, had commenced with the operation for the removal of its contents; but as soon as he had divided the integuments the tumour became soft, and instantly afterwards subsided. He closed the incision and proceeded no further, telling the assistants that this occurrence had shown him the nature of the disease, and that copious bilious evacuations would soon take place. This directly occurred, and the patient recovered.—The symptoms distinguishing between these two lesions are the following:—1. The rapid appearance and circumscribed form of the tumour, with manifest fluctuation throughout its extent, when it proceeds from the gall-bladder.—2. The softness and mobility of the integuments over the more prominent parts of the tumour; and the absence of a diffused swelling or hardness at the circumference, and of oedema, or of an emphysematous feel, when it is thus produced.—3. Abscess of the liver is consequent upon inflammatory symptoms referrible to this viscus. The tumour it occasions forms slowly; is attended with great swelling, and tension in the parts adjoining; and is at first diffused, hard, and imperfectly defined. Fluctuation is very obscure, occurs late in the progress of the swelling, and is confined to the centre, the circumference being hard and tumid.—4. There are always febrile symptoms attendant upon this disease; but they are seldom observed in distension of the gall-bladder, unless inflammation has supervened.—5. Pain in suppuration is pulsatory, in the other it is not; and it generally intermits.—6.

Shivering is more frequently present in suppuration, or continues longer, than in distension of the gall-bladder; and it terminates in perspiration, which rarely occurs in the latter.—7. A distended gall-bladder presents more of the appearance of a deep-seated encysted tumour than of abscess.—(b) The swelling from encysted dropsy is larger, and the fluctuation more distinct, than from a distended gall-bladder.—(c) The same remark, however, does not apply to the encysted tumours that contain hydatids. Between both these and distension of the gall-bladder, the diagnosis is often very difficult, unless the appearances of the evacuations, and of the skin, are closely observed. In the latter, the stools are devoid of bile—are white or clayey, &c.; the urine is very dark, loaded, and clouded; and the skin discoloured or jaundiced. In the former, the stools are rarely without bile, and the other symptoms are seldom observed; as there is no interruption of the passage of this secretion into the duodenum, nor suppression of the function.

23. iii. The Treatment of excessive distension of the gall-bladder should not be materially different from that advised for the common occurrence of impaired action of the biliary passages (§ 16.). The alkaline subcarbonates, the spirits of nitric ether, and the extract of taraxacum, in liberal doses, either in camphor julap, or in the medicines prescribed above (§ 16.), or in the decoction of taraxacum, will often be serviceable; especially when the use of them is steadily persisted in, is varied according to circumstances, and is aided by the external remedies already mentioned (§ 17.). When the distension seems to arise from the arrest of biliary concretions in the common duct, or, indeed, from any other cause, the liquor potassæ, Castile soap, the subborate of soda, antimonials in small doses, anodynes, the warm bath, and oleaginous aperients, as olive oil, &c. will be the most useful.—*Emetics* are dangerous; but laxatives, mild purgatives, and aperient enemata are beneficial, and should be continued from time to time. In all cases of biliary obstruction, the means enumerated at another place (see art. CONCRETIONS.—*Biliary*, 14. *et seq.*) will be also very appropriate.—The most suitable beverages are the common imperial drink, or a solution of equal parts of the super-tartrate of potash and subborate of soda, dissolved in a weak decoction of marsh-mallows, or of taraxacum, with a little orange-peel, &c.; or warm whey, or soda water, or spruce beer. The facitious waters of Seidschutz, or of Geilnau, or of Marienbad, or the mineral waters of Seidlitz, of Leamington, or of Scarborough, are often of service both in this and other forms of biliary obstruction. But I believe that there is no mineral water more beneficial than that most common of all mineral waters, namely, sea water, when it is taken in sufficient quantity, and persisted in for a reasonable period.

IV. INFLAMMATION OF THE GALL-BLADDER AND DUCTS. *Hepatitis Cystica*, Sauvages; *Cholecystitis*, Hildenbrand.

CLASSIF.—II. CLASS, III. ORDER (Author).

24. DEFIN.—Deep-seated acute pain in the epigastric region, extending to the right hypochondrium, and backwards, generally with vomiting of a greenish bile, frequently with jaundice, and always with symptomatic fever.

GALL BLADDER AND DUCTS — ALTERATIONS OF.

25. i. The *Symptoms* of inflammation of the gall bladder or ducts are extremely fallacious. This disease may be either acute, sub-acute, or chronic; and, in either of these states, it is generally consecutive of inflammation of the concave surface of the liver, or of obstructions of the ducts, or of the irritation of biliary concretions; and hence its approach is slow and insidious, or the symptoms attending it are merely an aggravation of those produced by the antecedent disorder. This is especially the case when it occurs in a chronic or sub-acute form. Chills or rigors may or may not occur; but they are generally preceded by pain, more or less severe and acute, in the situation mentioned above. Vomiting is frequently present, and the matters ejected are often greenish. There is great tenderness at the epigastrium; and pressure is apt to excite vomiting. Severe colicky pains are felt in the upper regions of the abdomen; and jaundice sometimes appears suddenly. The attendant fever is characterised by a small or constricted pulse; by evening exacerbations; by a very dark, turbid, and scanty urine, and by thirst. The stools are generally devoid of bile. These are the most constant symptoms of inflammation of this viscus; but they are not altogether to be depended upon; for they are usually present in hepatitis, and even in duodenitis or gastritis. — Another circumstance, which adds to the difficulty of diagnosis, besides its mode of accession, is its frequent complication with these diseases, or with dropsical effusion, especially in the abdominal cavity. But inflammation of the gall bladder or ducts is often consequent upon excessive distension; and, when this is the case, the characteristic symptoms commonly follow a more or less distinct tumour in some one of the situations I have noticed above; and the nature of the complaint is thereby made manifest; jaundice and white stools, with very dark urine, being then seldom or never wanting.

26. ii. *Changes consequent of Inflammation of the Gall-bladder, &c.* — These are various. I shall take a brief view of the most common. — (a) *Suppuration, ulceration, and softening*, are not infrequent. The gall-bladder may be almost filled with pus from inflammation of its internal surface; but the admixture of pus with the bile, and ulceration, are more common. Cases of this kind have been noticed by VETTER, MOROAGNI, AMYAND, WALTER, MORAND, FRANK, BAILLIE, SOEEMMERRING, MARTIN SOLON, and ANDRAL. The ulceration may pass into *perforation*, or even *rupture*, without any very considerable distension of the viscus having previously occurred; the bile being effused in the peritoneal cavity, or into some adjoining viscus, in the manner already noticed (§ 19.). In cases of ulceration and rupture, *softening* is not often absent; and probably it favours the latter occurrence. — (b) *Gangrene* is a very rare occurrence. I have seen it mentioned only by J. P. FRANK. — (c) When inflammation either commences in, or extends to, the more external coats of the gall-bladder, *adhesions* of it take place to adjoining parts. It has been seen adhering to the peritoneum, by BLOCH, PETIT, &c. — to the omentum, by WALTER — to the duodenum, by LUDWIG, FRANK, PORRAL, REYNAUD, myself, and others — to the colon, by WALTER, &c. — and to the liver, by ANNESLEY, myself, and several writers. These adhesions

may exist either with or without distension, or the presence of biliary concretions; but either, or both, are often observed, or have manifestly existed at one period or other of the disease. — (d) *Thickening* of the coats of the viscus is evidently a consequence of inflammation in some one of its grades. It has been remarked by SCHMALZ, WALTER, J. P. FRANK, SOEEMMERRING, ANDRAL, and myself. STOLL and LEVEILLIE have noticed the thickening, conjoined with a *cartilaginous induration*. — (e) *Ossific deposits* in its coats have been found by RHODIUS, WALTER, MURRAY, GRANDCHAMP, MOILLINELLI, BAILLIE, and ANDRAL.

27. There are various other alterations of the gall-bladder which do not necessarily arise from any grade or mode of inflammation, and which may be noticed at this place. — a. The gall-bladder may be *hypertrophied* in respect both of its capacity and the thickness of its coats. The simple distension arising from obstruction of the common duct cannot be justly called hypertrophy, although some French pathologists have thus denominated it. — b. *Atrophy*, or wasting, of it is not uncommon, even as a consequence of chronic inflammation affecting either itself or the ducts, particularly the cystic duct. Instances of this change are recorded by MOROAGNI, WALTER, ROSSI, SOEEMMERRING, HUETLAND and ANDRAL. In these cases, the passage of bile into or from it having been prevented, the portion of this fluid contained by it has been absorbed, and the functions of the viscus having ceased, its structure has gradually wasted, until it has almost disappeared. — c. Instances, in which the gall-bladder has been either congenitally wanting, or has disappeared from antecedent disease, have been adduced by FERNELIUS, MARCELLUS DONATIUS, SCHENCK, HUBER, MOROAGNI, JAEGER, LUDWIG, SANDFORT, ZEIGLER, BALDINGER, LEMERY, BOULET, TARGIONI, POZZETTI, LITRE, WIEDEMANN, OTTO, DENDY, &c. — That this viscus may entirely disappear, in the same manner as it becomes atrophied, may be admitted. When only atrophy has occurred, there is still some little cavity left; but when the bladder has disappeared, the cystic duct is reduced to a fibrous chord terminating in a mass of cellular tissue. — d. The coats of the gall-bladder may, moreover, be infiltrated with serum, or contain *tuberculous*, or *calcareous matters*.

28. iii. The *Ducts* — the *hepatic, cystic, and common* — are liable to all the changes noticed with reference to the gall-bladder — to distension, obstruction, inflammation, thickening, ulceration, softening, perforation, rupture, hypertrophy, atrophy, obliteration, &c. — The symptoms however, attending these lesions during life are very equivocal. The symptoms, proceeding from inflammation closely resemble those enumerated as indicating inflammation of the gall-bladder. Most of the changes, to which the ducts are obnoxious, are the effects either of concretions obstructing and irritating them, or of inflammation having extended to, or been excited in, them. Inflammation, whether it extends to them from the duodenum, or from any other part, or arises from the acrimony of the secretion passing along them, is equally accompanied by swelling of their coats, and by more or less complete obstruction of their canals, often with softening or ulceration. — *Constriction or narrowing* from this cause has

been observed by BONET, HOFFMANN, MEAD, BIANCHI, BRÜNING, CRICHTON, BAILLIE, ANDRAL, &c.; and complete *obliteration* of one or other of them has been remarked by myself and most of the writers referred to in this article.—*Ossification* of them has been seen by BONET and SOEMMERING.—*Dilatation*, principally of the common and hepatic ducts, is recorded by SCHENCK, DUVERNEY, MORGAGNI, WALTER, RICHTER, DUPLAY, ANDRAL, and TODD.—*Rupture* of these ducts has occurred to WOLFF, ANDRAL, and others. References to all the foregoing lesions will be found at the end of the article.

29. iv. *Spasm of the Bile-ducts*.—The existence of this disorder has been presumed rather than proved. Without denying, however, its occurrence, particularly when acid bile, or gall-stones, are passing along the ducts, I believe that it seldom takes place unless from these causes, and in connection with inflammatory irritation.—The instances of sudden appearance of jaundice sometimes met with have been imputed to spasm of the ducts; but, although spasm may occur independently either of inflammation, or of biliary concretions, yet the pathological state producing jaundice is most frequently seated in the liver itself. The affection, therefore, which has been generally ascribed to spasm of these canals should be rather imputed to either of the above causes, or to any two of them.—1st, to inflammatory irritation without calculi; 2dly, to the irritation produced by calculi; 3dly, to irritation caused by acrid bile; 4thly, to spasm chiefly; and 5thly, to either of the foregoing in connection with spasm.—It is hence most difficult to distinguish spasm from inflammation of the ducts, or either of these from the passage of gall-stones. Indeed, the symptoms indicating the latter are in no respect different from those attending upon most of the cases generally imputed to spasm.—A sudden, sharp, deep-seated, and severe pain at the pit of the stomach, darting back to the right side of the spine, or to the lower angle of the right shoulder-blade, and to the hypochondrium, occurring in paroxysms, and often followed by rigors, coldness of the extremities, &c., are felt in both. Nausea and vomiting are sometimes also present. When, however, the disorder proceeds chiefly from spasm, pressure gives relief of the pain in the epigastrium, as well as of the colicky pains usually felt at intervals in the abdomen.—The patient commonly turns upon his belly, or lies partly on the right side, and partly on the abdomen. Thus, in connection with the slight affection of the pulse, chiefly distinguishes spasm, from inflammation, of the ducts. In other respects the symptoms are nearly the same as those stated to indicate the passage of the gall-stones.—(See art. CONCRETIONS — *Biliary*, § 8.)

30. v. *TREATMENT*.—*Inflammation of the gall-bladder and ducts* should be treated in a nearly similar manner to other inflammations, but with reference to the organisation and functions of the part. The *first intention* should be, to remove the inflammation; the *second*, to procure a free and healthy flow of bile into the duodenum. *Bloodletting*, both general and local, is always requisite; and generally tends to the fulfilment of both indications. Immediately after the first bloodletting, a full dose of *calomel*—from five to

twenty grains—according to the age and strength of the patient, with *James's powder* and *opium* or *hyoscyamus*, may be given, with few exceptions. Experience has proved the propriety of exhibiting one or two doses of this medicine, in cases where these parts have been either partially or chiefly implicated, and the experiments of Mr. ANNESLEY have demonstrated the influence of a large dose of calomel in diminishing inflammatory irritation of the stomach and duodenum,—an effect which, if produced in these viscera, will probably extend to the gall-ducts. If a repetition of the bleeding should be necessary, the calomel, nitmony, and opium may be repeated immediately afterwards, as this combination has a most decided effect, when thus exhibited, in diminishing vascular action, and in equalising the circulation. Mild *aperients* and *cathartic enemata* may subsequently be given; and, having thereby procured evacuations, medicine of a *deobstruent* and *relaxant* kind should be prescribed. The *alkaline subcarbonates* with *taraxacum*; the *suborate of soda*, in the decoction *althææ*, with small doses of *ipeacuanha*, and of the powder or the extract of the leaves of *belladonna*, and the *nitrate of potash* or *muriate of ammonia*, in camphor mixture, with large doses of the *spirits of nitric ether*; are the most appropriate medicines; but they should be given in repeated doses, and so as not to offend the stomach.

31. Of the *external applications*, the most efficacious are the warm *terebinthinated embrocation*, *warm poultices*, *fomentations*, and afterwards a plaster, consisting either of the *emplastrum ammoniaci cum hydrargyro*, or chiefly of the extract of *belladonna* and *camphor*, according to the peculiarities of the case.—Having removed inflammation, and relieved the more urgent symptoms, by these or similar means, a due flow of bile into the duodenum should be promoted by small doses of blue pill, or of PLUMMER'S pill, the liquor potassæ, or the subcarbonates of soda or potash, or the suborate of soda, or the acetate of potash, or the extracts or decoction of *taraxacum* or of *chelidonium*, or the ethers, &c. variously combined. A gentle action on the bowels, by emollient and oleaginous medicines, should be continued for some time. If pain of a spasmodic kind recur, *belladonna*, or *hyoscyamus*, or *opium*, or *colchicum*, may be given with these; and if the irritation seem to be owing to the presence of gall-stones, the combination of the spirits of turpentine, with sulphuric ether as advised by DURANDE, STRAUB, WITTING, QUARIN, and others, or with alcohol, as recommended by PENCIVAT, or with the spirits of nitric æther as directed by WOLFF, may be tried. An anodyne may also be given with either of these combinations, especially *hyoscyamus*, or *belladonna*.—*Colchicum*, with the alkaline subcarbonates, has proved of great benefit in some cases in which I believed the biliary passages to have been implicated in the inflammation of the associated viscera; and *prussic acid*, given in full doses with olive oil, or with almond oil and camphor julap, has afforded great relief where there was every reason to suppose that gall-stones or spasm was the cause of suffering.—The treatment in other respects, as well as the diet and regimen of the patient, are altogether the same as are fully detailed in the articles CONCRETIONS — *Biliary*, and JAUNDICE.

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GANGRENE.—**SYN.** *Gangræna*; *Sphacelus*; *Mortification.*—*Γάγγραινα* (from γάγαι, I eat or devour). *Gangrène*; Fr. *Der Brand*, Germ. *Gangrena*, Ital.:

CLASSIF.—IV. CLASS, IV. ORDER (*Author*, in *Preface*).

1. **DEFIN.**—*Death of a part or the whole of an organ.*

2. The terms *gangrene*, *sphacelus*, and *mortification* are usually applied to the same condition, especially by Continental writers. Dr. CARSWELL has pointed out certain distinctions between them, restricting the first appellation to incipient mortification, and the second to the last stage of this lesion. He has thus made *Mortification* to be the generic term. This is in accordance with the meaning usually attached to the terms in this country; but, as mortification is the last result of the morbid state—is no longer a disease, but its termination—I have preferred the first of these appellations; and especially as it is the most appropriate to the changes generally comprised under these terms, and as it is usually applied to a lesion which, in respect of its nature and treatment, comes much more within the province of the medical practitioner, than that which the terms *sphacelus* and *mortification* are generally employed to represent. — Formerly, *gangrene*, particularly in its medical relations, was considered merely as a consequence of inflammation; but a more extended view of it has been taken by some Continental writers: and, still more recently, it has been treated by Dr. CARSWELL in an able and comprehensive manner. The *division* of this subject must necessarily have an intimate relation to the principal causes which produce it. In considering, therefore, the *pathological relations of gangrene*, I shall view it successively—1st, As a consequence of inflammation; 2dly, As a result of local or general debility or exhaustion interesting chiefly the organic nervous influence; 3dly, As an effect of obstructed circulation; 4thly, As produced by various physical agents; and 5thly, As occasioned by poisonous substances.

3. 1. — **PATHOLOGICAL RELATIONS OF GANGRENE.**—I. GANGRENE CONSEQUENT UPON INFLAMMATION. — All parts susceptible of inflammation may become gangrenous in consequence of it; but there are various circumstances that cause this change to be more common in some tissues or parts, than in others. The *vascularity* of a part disposes it to inflammation, and consequently to gangrene. Hence, cellular and mucous tissues are much more liable to it, than fibrous and serous structures. The latter never experiences it until the cellular tissues by which they are nourished have undergone a similar change. — The *sensibility*, *excitability*, and *susceptibility* of a part have also a great influence in producing it; the disposition to inflammation, and to gangrene as one of its results, being in proportion to the grades of these properties with which an

GANGRENE — FROM INFLAMMATION.

organ or structure is endowed. — The situation of a part or structure at a distance from the centre of vital or nervous influence, and of circulation, has also some influence in favouring the termination of inflammation in gangrene. Also, intense grades of inflammation in these parts may proceed until this result takes place, without causing death; whereas inflammations of the more vital and central organs, as the heart, brain, &c., put an end to life before this change has supervened.

4. Various pathological states dispose not only to inflammation, but also to the supervention of gangrene. The most important of these are — *a.* Disorder of the digestive organs, especially impaired energy of the organs most directly influenced by the organic nervous system; — *b.* A weak and irritable state of constitution; — *c.* Exhaustion by previous disease, particularly by fevers and epidemic maladies; — *d.* Interruptions of the excreting functions, and of the depurative action resulting therefrom; — Morbid conditions of the blood, as in typhoid, malignant, and exanthematous fevers, in erysipelas, and in scurvy; — *f.* Pre-existent functional or structural changes in a part, as impeded circulation, congestion, &c.; — *g.* Interrupted circulation in an adjoining organ, or obstructed return of the venous blood from the part affected. These conditions not merely predispose to inflammation, but also modify its characters, and favour most remarkably the occurrence of gangrene, especially when more than one of them are in operation; as in erysipelas, in which we generally observe the inflammatory action supervene on marked disorder of the digestive and excreting functions, on a morbid state of the circulating fluids, and on disordered circulation in the part.

5. The Causes which induce inflammation also influence its termination in gangrene, but to a much less extent than the influences already noticed, unless they be of a disorganising or poisonous kind, when they more properly fall under a different head. *Intensity of the exciting causes*, relatively to the excitability and susceptibility of the part, have some influence, especially when it is great; the consequent vascular reaction, in connection with the morbid impression made by the cause upon the vital properties of the part, often rendering inflammation more acute and severe, and thereby more prone to exhaust vital power, or to pass into gangrenous disorganisation. But agents which excite inflammation, without producing a mechanical, chemical, or poisonous operation, do not very remarkably favour the occurrence of gangrene, independently of this circumstance, and of those already enumerated. The disposition to terminate in gangrene will doubtless be increased by the intensity of the local and general vascular action relatively to the state of constitutional power; but such intensity of action will itself, in a great measure, result from the circumstances already enumerated. In a word, therefore, the causes of inflammation passing into gangrene, are those stated above, in connection, with peculiarity of temperament, constitution and habit of body, and with the intensity of local and general vascular action, relatively to vital resistance or power, characterising the inflammatory state.

6. *A. Of the Phenomena of Gangrene from Inflammation. — a. In respect of particular Tissues and Organs. — a. Of the integuments. —*

When inflammation is about to pass into gangrene, very evident changes take place in the colour, temperature, sensibility, and vital cohesion of the part. The redness becomes darker, or changes to a livid, violet, purplish, or black hue. The morbidly increased temperature and the augmented sensibility of the inflamed part are remarkably lessened; and the pain has disappeared from it, and extended to the surrounding structures. The vital cohesion of the part is much weakened, although its density is sometimes augmented. — Vesicles also appear on the surface, owing to the effusion of serum, or of a sanguinolent serum, under the cuticle. — These changes become more manifest as the gangrene passes into its second stage, or sphacelus. The colour becomes grey, yellowish grey, greenish, brown, or black, or various intermediate shades. The vesicles are now enlarged, or the cuticle is entirely separated by the effusion of a bloody serum beneath it, which escapes and leaves the skin loosely covered by it, or partially denuded and discoloured. The integument crepitates on pressure, is puffy, soft, cold, and insensible. It soon afterwards emits a cadaverous and offensive odour, indicating that the gangrened part is quite dead, and is undergoing decomposition.

7. The emphysema and fœtor of the part are proofs of the gangrene having arrived at complete mortification and putrefaction; but the part may be completely dead without these phenomena being observed. Among the chief changes that occur after gangrene has taken place, are the spreading and limitation of it. The former is increased by whatever depresses the organic nervous power or contaminates the blood; and as long as it continues, the dark red or livid discolouration attending it extends further and further, and gradually disappears in the surrounding sound skin. The latter change is promoted by whatever restores nervous energy, increases vital resistance, and promotes the assimilating and excreting functions. As soon as it commences, the livid or dark red discolouration of the circumference or margin of the gangrened part is more narrowed. Ulceration commences at the margin of the inflamed part, and separates from it, in the form of slough, the portion which had become gangrenous. The loss which is thus occasioned, is partially repaired by the exudation of coagulable lymph, which, becoming organised in the form of granulation, assume more and more of a membranous form, and constitute, in its complete state of reparation, the cicatrix. — A favourable change in the part and in the constitutional affection may occur at an early period of gangrene, and the result may be still more felicitous. In this case, the dark red or livid colour of the affected part becomes more circumscribed, and assumes a brighter tint: the swelling subsides, and the temperature gradually returns; all the functions, as well as the organisation, are preserved. — Gangrene of the skin always implicates to a greater or less extent the subjacent cellular tissue; but this latter may be the primary and chief seat of this change.

8. *B. Gangrene of the cellular tissue. —* This tissue is more frequently, more extensively, and more rapidly affected by gangrene than any other part, more particularly where it is most abundant or is covered by aponeurotic expansions, which prevent contaminating fluids from reaching the

surface.—Gangrene of this tissue is either *diffused* or *circumscribed*. In the *diffused form*, it generally occurs in external parts, and most commonly follows erysipelas, and diffused inflammation of the cellular tissue from abrasions, wounds, punctures, and the inoculation of morbid or putrid matter, as by wounds in dissection. In these cases the inflammation spreads rapidly and extensively, terminates quickly in gangrene, and often extends to the blood-vessels, tendons, aponeuroses, and lymphatics. These resist, for a longer time, the disorganising process; and are often seen, especially in the extremities, running in the midst of decomposed cellular tissue, and of effused fluid. If the inflammation affect the interior of a considerable venous or arterial trunk, particularly that which chiefly supplies a limb, the circulation through it is interrupted by the lymph effused in its canal, and the entire part beyond the seat of obstruction is struck by gangrene. In the internal viscera, gangrene very seldom occurs in a diffused form, unless in cases where erysipelas extends to the fauces and parynx, or in the more malignant cases of angina.

9. *Circumscribed gangrene* of the cellular tissue is seen in that connected with the integuments, in the common boil, and in carbuncle. When gangrene is observed in the cellular tissue of internal organs, it almost always is circumscribed. When the *submucous tissue* is its seat, it generally is in spots or patches of various dimensions, and is consecutive of inflammation which has commenced in the mucous membrane, and extended thence to the submucous tissue. In such cases, particularly in dysentery, considerable portions of the mucous surface are detached, owing to gangrene of its subjacent tissue. —Although gangrene of the *subserous cellular tissue* is more or less circumscribed, yet it is often extensive; but, in these latter instances, the serous membrane is also implicated. This is especially the case when the sub-peritoneal tissue is the seat of lesion. It is rarely, however, that the inflammation of it, which terminates in this manner, commences in the peritoneum, unless in some cases of strangulation from hernia or intussusception. It commonly either originates in the cellular tissue itself, or extends to it from adjoining parts. Indeed, this is always the case in respect of the subperitoneal tissue of the lumbar, iliac, and pelvic regions.

10. *γ. Mucous membranes* are sometimes found gangrenous; but not so frequently as was supposed by the older writers, who mistook softening, discolouration from the imbibition of morbid secretions, and even albuminous exudations thrown out on their surfaces, in the form of false membranes, for sphacelation.—Gangrene of this membrane is generally circumscribed, often very limited, and seated chiefly in the throat, the lower part of the ilium, in the cæcum, the sigmoid flexure of the colon, and in the rectum. The inflammation producing it commences, and is chiefly seated, in the mucous tissue itself, or in the follicles, or in both. The gangrene may be limited to either of these, or may extend to both, and even to the subjacent cellular tissue. Where thus changed, the mucous membrane at first presents an ash grey or greyish yellow colour, which often changes to brown or black; but the gangrened part may be tinged by the secretions

or other substances applied to it, especially by the bile, or by the blood.—The part surrounding the slough is generally congested, of a brownish red, or of a purple, or livid hue. Dr. CARSWELL remarks that, when the inflammation has been confined to the agminated, or PEYER's, follicles, and when the greater part, or the whole, of the follicle has sloughed, little congestion or inflammatory redness may remain. If these glands are already the seat of disease—as in continued and hectic fevers, consumption, &c.—a slight attack of inflammation may destroy their vitality, and little or no vascularity may be observed around them after death. The mucous surface of the bronchi is rarely the seat of gangrene, and only consecutively of inflammation of adjoining parts. —Gangrene of the mucous surface of the *uterus* and *vagina* is not infrequently seen in dissections after puerperal fevers. (See PUERPERAL DISEASES, and UTERUS.)

11. *δ. Serous membranes* are the seats of gangrene, only consecutively of this, or of some other cause, as suppuration, ulceration, &c. in the subserous tissue, as noticed above (§ 9.). When ulceration of any part of the digestive canal extends to the peritoneal surface, this membrane, having lost the supply of blood from the subjacent tissue, sometimes experiences sloughing at the bottom of the ulcer, and consequent perforation. But this is observed chiefly when the ulcer is large, and the patient's habit of body cachectic; and most frequently in the lower part of the ilium.—The *pleura* is more rarely the seat of gangrene than the peritoneum; and the costal pleura is still more rarely affected than the pulmonary pleura. Gangrene of the latter is met with as a result of the softening of tubercles situated immediately underneath the pleura, or of gangrene of a subjacent portion of the lungs. —The serous membranes of the brain are gangrenous only as a consequence of severe injury; particularly when the membranes are exposed, and when the part is affected by erysipelas or hospital gangrene. This latter cause of gangrene of the cerebral serous membranes has been noticed by Mr. COPLAND HUTCHISON. When the serous membrane is sphacelated, it assumes an ash grey or slate colour; but it may be variously tinged by bile, blood, or morbid matters. It is also soft and spongy, and is readily detached from the surrounding tissues, which are usually more or less injected.

12. *ε. Fibrous tissues* become gangrenous only in consequence of this lesion in the immediately adjoining parts. —The *muscular tissue* is very rarely seized by gangrene after inflammation. The muscular tunics of the digestive canal are sometimes, however, thus affected, owing to the extension of gangrene from the associated tissues, as in the case of sloughing ulcers commencing in the internal coats of the tube. If recovery take place after a portion of the muscular tunic has been thus destroyed, the cicatrix which is formed contracts, as Dr. CARSWELL has stated, and the diameter of the canal is permanently lessened.—The *heart* is, perhaps, never even partially gangrenous whilst life continues; and the *arteries* and *veins* are never the seat of this change until the surrounding cellular tissue, and cellular coats of these vessels, are destroyed by it. Gangrene of the *brain*, of the *lungs*, of the *liver*, of the *spleen*, of the *kidneys*, of the *uterus*, &c. is

noticed in the articles devoted to the pathology of these organs.

13. *b. The changes which take place in the capillary circulation*, when the inflamed part is about to pass into gangrene, have been observed by several pathologists, but by none with so much care and precision as by KALTENBRUNNER (*Exper. circa Statum Sang. et Ves. in Inflam.* 4to. Mon. 1826, p. 82.) and GENDRIN (*Hist. Anat. des Inflam.* t. i. p. 31. *et passim*). According to their researches, and my own observations, the capillaries lose their tonicity and vital cohesion, become distended or even ruptured, or allow the exudation of a portion of their contents. At the same time, the blood in the distended capillaries ceases to circulate; changes from a dark red, to a dark brown or black hue; and coagulates; its globules uniting, adhering to the internal surface of the vessels, and filling their canals. A similar change takes place in whatever blood may have been effused into the areolæ of the tissues during the acme of the inflammatory state, or the passage of it into gangrene. This alteration of the blood and of the capillaries causes the livid, purple, or black hue of the affected part; and the loss of vital cohesion, and exudation of the serum, occasionally with some of the dark colouring matter of the decomposed blood, produce the soft pulpy state attending the passage of gangrene into sphacelus. With the cessation of circulation, the sensibility is quickly lost; and when the part is deprived of its vitality, incision of it neither excites sensation, nor causes loss of blood. Absorption, also, entirely ceases in the gangrened part; but proceeds with activity at the margins of the living and sphacelated tissues, as shown by the local and constitutional phenomena, and by the separation between the living and dead parts, which is partly occasioned by this process.

14. *B. Terminations, &c.* — The changes that take place in the margin of the living inflamed part are important, as upon these depends the occurrence of one or other of the following phenomena. — 1st. The limitation of the gangrene, and separation of the diseased part; — 2d. The spreading of the gangrene, and the contamination of the circulating fluids; — 3d. Dangerous or fatal hæmorrhage; — and, 4th. Ulceration. — (*a*) The entire separation of the gangrened part, in a state of sphacelus, is caused by the production of coagulable lymph in the inflamed parts surrounding the gangrene. This lymph prevents the decomposed fluids from contaminating the surrounding tissues, by agglutinating not only the areolæ of these tissues, but also the orifices or canals of the minute vessels. It also promotes the coagulation of the blood in the larger vessels, and thereby prevents the occurrence of hæmorrhage. It lastly, as the separation is perfected, becomes organised, in the tissues which it agglutinates, or in which it is effused, and is essential to the healing of the part. — (*b*) The spreading of the gangrene arises from the local and constitutional vascular action being so weak, or asthenic, or otherwise so morbid, as to be incapable of forming coagulable lymph, whereby the contaminating influence of the decomposed fluids and sphacelated tissues upon the surrounding parts may be resisted, the minute vessels agglutinated, their fluids coagulated, and absorption prevented.

When this result is observed, the vital power of the part, or of the constitution, is in fault; and either a cachectic habit of body, or a morbid state of the blood, has preceded the occurrence of gangrene, as in erysipelas, scurvy, fever, &c. —

(*c*) *Hæmorrhage* may attend either of the preceding states of sphacelation. In the former, it arises from an imperfect coagulation of the blood in the large vessels, at the margin of the living inflamed part; the lymph not being sufficient to obstruct its extremity, or to coagulate the blood in it with the requisite firmness. In the latter, the hæmorrhage is much more frequent, as these circumstances obtain much more generally, and to a greater extent in it, than in the former. —

(*d*) *Ulceration* may follow either internal or external gangrene. In these cases, organisation of the coagulable lymph that is formed, or granulation, does not take place; but absorption of it with the tissue in which it is deposited proceeds gradually. It is owing to this, that perforation of hollow organs follows sphacelus. When the mortified part is retained, owing to its situation, or is not thrown off, it becomes macerated, or reduced to shreds, by the fluids poured out by the surrounding vessels. A partial absorption may occur in these cases, and, by contaminating the circulating fluids, terminate life in a short time, or place it in imminent danger. — In some instances, as intussusceptions, adhesions of the opposed margins of the living inflamed parts may take place, with perfect union, the sphacelated portion being evacuated. A dead part of the lung may also be thrown off by the bronchi.

15. When gangrene, in its earlier stage, is arrested, and terminates in restoration of the healthy state, the blood begins to move in the obstructed capillaries, and the circulation, especially at the circumference, becomes more and more active. The globules of the coagulated blood seem to separate, and to pass into the currents of the minute canals; sensibility gradually returns; and the colour of the part becomes less dark or livid. The temperature also rises; and the absorption of the effused fluid commences. At last, the size and firmness of the part, with all its functions, are restored.

16. *II. GANGRENE FROM LOCAL OR GENERAL DEBILITY* — *from Exhaustion of Organic Nervous Power.* — Depression of the organic nervous or vital influence is the chief pathological element or precursor of this form of gangrene, which, owing to this circumstance, is contingent on certain adynamic diseases, as typhoid fevers, scurvy, noma or gangrenous thrush, and other maladies attended by extreme asthenia. This variety is often preceded by increased sensibility, heat, and injection of the part. The last of these characteristics is the most common; and is frequently caused by pressure, as observed in the parts on which patients rest in bed, by friction, puncture, and the irritation of morbid secretions. The application of leeches, blisters, or the tartarised antimonial ointment to debilitated or cachectic children often produces it. But it occasionally appears, and proceeds rapidly, without any very manifest antecedent, or attendant, inflammatory action — certainly without increased action of a sthenic kind — particularly in very unhealthy children, and in persons affected by scurvy, or the low putro-adynamic states of fever. In these,

very slight causes will occasion engorgement of portions of the integuments, or of internal viscera, followed by the changes already described as constituting gangrene and sphacelus; and local congestions will sometimes occur and be followed by loss of vitality, without any obvious cause, or any obstruction to the circulation, or manifest increase of vascular action in the part; whatever action may appear being of an irritable, asthenic, or extremely weak kind. The gangrenous or asthenic form of *furunculi*, and the humid or phagedenic sores met with in the mouth, gums, cheeks, genitals, &c., of unhealthy children, are illustrations of this variety — the chief characteristics of which are, depressed organic nervous or vital power; imperfect or asthenic vascular action, both previous to, and attendant upon, the gangrenous lesion; and a poor or vitiated state of the circulating fluids. (See SCURVY; and THROMB — *Gangrenous*.)

17. *iii. GANGRENE FROM OBSTRUCTED CIRCULATION.* — The arteries may be incapable of conveying blood to, and the veins of returning it from, a part. In the preceding varieties of gangrene, the organic nerves and capillaries are the primary and chief seats of the lesion. In this variety, they are consecutively affected, owing to the obstruction which causes it either cutting off their supply of blood, or preventing the return of it. — The changes which take place in either case are somewhat different, particularly as to the order of their procession. When the blood is sent in insufficient quantity to, or is entirely prevented from arriving at, an organ or part, the effect upon the nervous and vascular organisation of it must be such as to cause its atrophy or death; for the fluid requisite to nutrition and life is no longer supplied to it. But when the return of the blood is obstructed by lesions of venous trunks, or by tumours pressing upon them, or by disease of the heart, an undue accumulation of blood takes place in the capillaries and veins beneath the seat of obstruction; the blood stagnates more or less; the capillaries are distended beyond their powers of reaction, and their tonicity is exhausted; effusion supervenes in the more porous and yielding tissues; the organic nervous and vital power of the part, already impaired by the stagnation of the capillary circulation and the venous properties of the blood, are still further depressed by the progressive effusion and distension; and at last, if the obstruction become complete, the vital manifestations of both nerves and capillaries are entirely extinguished. The varieties which thus proceed from these different pathological states require separate notices.

18. *A. Gangrene from Obstruction of Arteries.* — A ligature placed around an arterial trunk, when the circulation is not supplied by collateral or anastomosing branches; the rupture of the internal and middle coats of an artery, occasioning obstruction of its canal; inflammation, followed by the accumulation of fibrinous lymph in its interior, and obliteration of the vessel; and osseous or fibrinous deposits in its coats or in its cavity; are the circumstances which give rise to this variety. — *a. Gangrene from rupture of the internal coats of an artery* has been described by Professors TURNER and CARSWELL. The rupture of these coats is obviously the result of pre-

vious disease. But, however produced, it is manifest that the lacerated part, with the lymph effused from it, will often prove a nucleus around which a fibrinous coagulum will form, and increase until the circulation in the vessel is entirely obstructed. The gangrene will be merely contingent upon this occurrence; for the coagulum may not entirely obstruct the vessel; or the obstruction may be complete, and yet the circulation may be carried on by collateral, or by enlarged anastomosing vessels. — An abstract of one of the cases detailed by Mr. TURNER will illustrate the progress of gangrene from this cause, as it agrees with one which I had an opportunity of seeing, and in which amputation was performed. About half an hour after rupture of the popliteal artery, no pulsation could be felt in any of the arteries of the foot, nor in the ham. The foot was cold. No pain was excited by pressure on any part of the limb; but cramp-like pains were felt in the calf of the leg. The following morning the foot was pale and cold, and the integuments below the ankle were entirely void of sensation, even when pinched or tickled. The muscles of the foot seemed to have lost their power of contraction. The next day, mottled purple patches appeared on the instep and fore-part of the ankle, and gradually extended over the whole foot, till the surface, by the fifth day, was entirely livid. With the progress of discolouration, the foot swelled slightly, became oedematous, and seemed somewhat warmer. On the seventh day, several tense, globular vesications appeared on the foot, some filled with reddish, and others with pellucid serum. They increased in number, and extended to the calf of the leg. About the ninth day, the soft parts above the ankle were livid, the discolouration proceeding upwards to the calf of the leg, and soon afterwards nearly to the knee. The soft parts adjoining the discoloured skin were swollen, and very painful on pressure, but no redness nor any inflammatory line between the gangrened and living parts appeared. The discoloured parts were completely insensible. The patient had been much reduced by his previous illness; but with the progress of the gangrene, weakness, tendency to faint, copious sweatings, quick and feeble pulse, became very prominent symptoms, which were followed by cough, laborious breathing, and death upon attempting to sit up in bed. — The coats of the artery were found, torn, thickened, and the canal filled by fibrine, lymph, and coagulated blood.

19. *b. Inflammation of the internal coats of an artery*, particularly of one or more considerable branches, is followed by effects similar to those just described; especially if the obstruction of their canals, by lymph and coagula, be complete. Gangrene from this cause has been noticed in the article on *Inflammation of ARTERIES* (§ 29.). It may occur in internal viscera, as well as in external parts, although the evidence of its existence in the former is not so complete as may be desired. The gangrene that sometimes attacks a portion of the lungs may probably arise from this cause, but there is no satisfactory proof of such being the case. It does not, however, appear unreasonable to infer that, in some constitutions and habits of body, inflammation may extend from the substance of the lungs to the blood-vessels themselves — arteries or veins — and that the inflamed part may

rapidly pass into gangrene, owing to the obstruction of the circulation in one or other of these vessels.—Of the occurrence of gangrene of a limb from inflammation originating in a large artery, there can be no doubt, as several instances of this kind are on record. In these cases, the consequent obstruction of the main trunk may be sometimes attended by a partial collateral circulation, which, although insufficient to preserve the vitality of the whole limb, yet may preserve that of a considerable part below the place where the vessel is obstructed. A case illustrating this fact is recorded in the *London Medical Repository*, vol. xviii. p. 119.

20. *c. Gangrene from fibrinous or osseous formations in arteries — Senile gangrene — Idiopathic, dry, or spontaneous gangrene.*—When these formations are so extensive as to prevent the circulation through the main arterial trunks of a limb, a different route is often not established; the diseased state of the smaller vessels, especially those in connection with the affected trunks, indisposing them to become the collateral channels of circulation.—When an arterial trunk is thus obliterated or obstructed, the gangrene generally commences with a dark brown, purple, or black spot in one or more of the toes, frequently without any previous swelling, or any increased heat or sensibility. Occasionally, a pricking or tingling sensation is felt in the discoloured toes, which are colder than natural, and often numb. The purple or black discolouration soon gains the whole of one or more toes. There is no increase of their size, but rather a diminution of it; and seldom pain on pressure. In some instances, however, increased temperature, sensibility, and bulk of the affected toes precede the changes just described. The discolouration proceeds gradually to all the toes, and thence over the back and sides of the foot. It sometimes extends as high as the knees; but death generally takes place before it reaches thus far. It is seldom preceded or attended by much swelling of the parts, which the gangrene successively invades; but there are occasionally seen a dark redness of the skin, with heat, pain, and slight puffiness or tumefaction. In many instances, particularly when the accession of the disease has been slow, the parts are even wasted before they are struck by gangrene; and, when this has been the case, they are afterwards shrunk, indurated, and dry. In more sudden and rapid attacks, where the obstruction is less complete than in these, Dr. CARSWELL justly remarks that considerable congestion is induced, with the effusion of more or less serosity, whereby the bulk of the foot, and, more frequently, of the leg, is augmented; but even in this case, the toes, the primary seat of the disease, are not increased in size. It is in the progress of the disease upwards that congestion or oedema occurs; that the skin becomes tense and painful; and that the febrile symptoms, if they have not yet appeared, supervene, increase rapidly, aggravate the local affection, and hasten death.

21. This form of gangrene seldom occurs before sixty, very rarely before fifty, and never in young persons. The obstructions found on dissection are ossification of the arteries of the affected limb, and often also of other parts of the body; and a fibrous tissue formed either in the coats or in the canals of the vessel. In these

latter cases, the artery is sometimes converted into a solid or ligamentous cord. Occasionally ossific spiculae or deposits project into the canal of an artery, solid fibrine having collected around them (see art. ARTERIES, § 63.). Instances of gangrene from disease of the arteries are recorded by SAVIARD, HÉBRÉARD, ANDRY, CHAVALLIER, BEGIN, HODGSON, CRUVELLHIER, AVISARI, MARJOLIN, SYME, and others, mentioned in the REFERENCES of this article. Two cases of the disease from ossification together with obliteration of arteries have occurred in my own practice. It has been supposed, that ossification of the principal arteries of a limb, will of itself produce gangrene; but it will not have this effect unless some other cause of obstruction, as narrowing of the canal, fibrinous formations, &c., be conjoined with it. The appearances in my own cases, as well as in those recorded by the other writers referred to, demonstrate this fact. In some of those the obstruction was not limited to the arteries, but was seated also in the veins. In the one examined by M. BRULATOUR, the arteries above the seat of gangrene were partially ossified, their calibre diminished, and their channels filled by solid fibrinous deposits. The coats of the veins were thickened, and fibrinous coagula adhered to their internal surface.—The lesions of both arteries and veins were evidently the consequences of inflammatory action of a sub-acute or chronic kind.

22. *B. Gangrene from Obstruction of Veins.*—Gangrene may arise from this cause both in external and internal parts; but especially in the latter.—*a.* It rarely occurs in the former, as the veins are so numerous, even in the extremities, as to admit of a collateral circulation, although many of them may be obstructed. I had, however, an opportunity of attending a case with Mr. DAVIES (*London Medical Repository*, vols. xxiii. p. 451., and xxiv. p. 51.), in which gangrene of the foot and great part of the leg took place, owing to interrupted circulation in the veins of the limb. On dissection, the femoral vein was found inflamed in the highest degree, and its coats thickened. It was full of coagulated blood. This state extended throughout the iliac vein into the cava, nearly as high as the diaphragm. All the small veins of the diseased limb seemed in a similar state.

23. *b. Internal gangrene* is often owing to pressure upon the veins, especially in cases of hernia and intussusception. But, in other instances, this cause is rather inferred than demonstrated. Dr. CARSWELL thinks that gangrene of portions of internal viscera, from the pressure of indurated tumours, is not uncommon, particularly in the lungs, liver, and intestines; but it seems to me, that the cause is seated as often within the veins, as external to them—that the obstruction frequently consists in obliteration of their canals, either from previous inflammation, or from coagula formed in them. This is evidently the chief cause of many cases of gangrene of a portion of the lungs; both veins and arteries running between, or in the vicinity of, excavations becoming obstructed, owing to the extension of the morbid action to them. But inflammation or obstruction, particularly of the veins, may have been induced by the transit of tubercular matter, or other morbid secretions, into them, which may either inflame their internal membrane, or coagulate the blood in them; the consequent obstruction causing

sphaciating ulcerations and cavities, or extending those which may have already commenced. In phthisis, attended by a very copious offensive expectoration, containing portions of softened cellular substance and tuberculous matter, or by a dirty brown, or greenish, or greyish sputum, with a gangrenous odour, the existence of one or other of these lesions may be inferred. — In cases of adventitious, cancerous, or other malignant formations, either the pressure of the tumour upon the adjoining veins, or the absorption of a portion of the morbid secretion, causing coagulation of the blood or other obstruction in the veins, sometimes gives rise to mortification of portions of the morbid mass, which may fall off in a state of gangrene or sphacelus.

24. In gangrene from intus-susception, the veins of the mesentery are pressed upon just at the points where the external and internal folds of the duplicature forming the invaginated portion of the intestine terminate superiorly. The consequence of this pressure or stricture is congestion of blood in the incarcerated part, and inflammation at the point of pressure or stricture.

When the inflammation is attended by the exudation of coagulable lymph, the adhesion of the strangulating and strangulated portions, just at the point of stricture, is the result, and the latter portion is evacuated in a gangrenous or sphacelated state; and either in one, or in successive portions. When the part is only gangrenous, it generally still retains its form, and the coats may be easily traced in it after maceration. The diameter of the intestine frequently experiences no diminution at the point of separation and union; and recovery may be complete, although a very large portion of the bowel may be lost in this manner. (See *Art. Colic*, and *ILEUS*, § 38.)

25. *C. Gangrene from Disease of the Heart.* — It occurs principally in the lower extremities, contingently upon impeded circulation in the veins with effusion of serum into the cellular tissue. Its progress is often slow; but it may be rapid. It is always consequent upon œdema or anasarca of the limbs, scrotum, and labia pudendi. When gangrene is likely to appear, the previously white, tense, and shining skin, becomes mottled with dull red or purplish spots, owing to the congestion of congeries of cutaneous veins. To these succeed bullæ or phlyctenæ, from the effusion of serum under the cuticle. Upon the bursting of these, the skin underneath is dark brown or livid, and is soon converted into an ash grey slough. Increased pain and redness are sometimes present, and either precede or accompany the separation of the dead part. Previously to the injection of the cutis, the temperature of the limb is usually very low; but as this change takes place, and as sloughs form, both the heat and the sensibility of the part are considerably augmented. Febrile symptoms, as well as local inflammatory action of an asthenic kind, often appear, in various grades; and the disorganisation supervenes and extends with increased rapidity. The gangrene may attack several parts of a leg, or even both legs; but it very seldom appears in the feet or toes. It rarely implicates any other tissue than the cellular, always beginning in the more superficial parts of it, to which this lesion is chiefly confined. In addition to the interrupted circulation through

the heart, the veins are inordinately pressed upon by the serum accumulated in the cellular areolæ between them and the stretched integuments; and the return of blood through them is thus further retarded. The distension, also, of the cellular tissue by the serum impairs the vital cohesion and power of resistance it previously possessed, and disposes it to experience a state of asthenic inflammatory action terminating rapidly either in gangrene or in some one of those sloughing abscesses described in the articles *ABSCESS*, and *CELLULAR TISSUE*.

26. *iv. FROM LESION OF NERVES.* — Gangrene has been supposed, by modern pathologists, to be sometimes occasioned by the loss of nervous influence, from injury or disease of the spinal cord, or of the nerves of a limb. TOMMASINI has even supposed that the inflammation of the nerves of a part is the cause of gangrene in all cases of acute inflammation terminating in this manner. But, we have no proofs of the accuracy of these views. Indeed, facts militate against them. There are numerous instances of the loss of the cerebro-spinal nervous influence of a limb, without much detriment to the functions of circulation, nutrition, and animal heat in it, when it has not been subjected to pressure. These functions are entirely dependent, as I have shown many years ago (*Lond. Med. Repos.* May, 1822), upon the supply of the organic or ganglionic nerves to the arteries, and are but slightly influenced by the cerebro-spinal nerves of the limb. Besides, many cases of inflammation of nerves have been observed, but gangrene has been very rarely seen to supervene, and even then, it has arisen from the extension of the inflammation to adjoining parts, more particularly to the blood-vessels. Phlebitis, and even arteritis, especially the former, are most prone to occur in females soon after childbirth, and the great majority of the cases of these diseases I have seen were consequent upon flooding. A similar cause is influential in the production of neuritis; and I have witnessed instances, where the affection of the limb was evidently this latter at the commencement, but complicated with disease of the blood-vessels in an advanced stage. One of these occurred in the practice of Mr. JOHN DAVIES, and was seen by me several times. In it gangrene came on; the limb was amputated by this very able practitioner; and the extent of lesion ascertained upon examination after death. M. DUCLOS (*Rév. Méd.* t. iii. 1824, p. 177.) mentions a case of neuritis, in a female, after parturition, complicated with flooding. The upper portion of the sciatic nerve was the seat of the disease; and the parts in the immediate vicinity soon became livid and œdematous. The dissection demonstrated inflammation of the nerve and gangrene of the adjoining tissues. A similar case is adduced by M. MARTINER (*Rév. Méd.* Juin, 1824). In it, besides distinct marks of inflammation of the superior part of the sciatic nerve, gangrene of the adjoining structures was observed after death, to a considerable extent below the diseased portion of nerve; the affection of the nerve having been anterior to the gangrenous alteration.

27. *v. GANGRENE FROM VARIOUS PHYSICAL AGENTS.* — (a) Severe contusions, or other local injuries — (b) powerful stimulants or irritants, or other chemical agents — and (c) excessive heat or cold — either directly or indirectly cause the

death of the parts on which they act.—*A.* The first of these falls within the province of the surgeon. It may, therefore, be only remarked that, when the injury is very severe, nervous influence and circulation may be so entirely annihilated as to prevent the return of action, and to cause the immediate death of the part. Contusions from spent shot &c. are often followed by this effect. But when the injury is less violent, the capillaries of the part have their tonicity impaired, and become congested; reaction of the larger vessels supervenes, owing to the consequent obstacle to the circulation, and to the effects of the injury on the adjoining parts, and increases the congestion of the capillaries; and the effect of this reaction, upon the injured and congested capillaries, is to exhaust their remaining vital endowment, and to produce gangrene of the part. In these cases, the surrounding tissues are inflamed; a separation of the gangrened portion takes place, as soon as its vitality is altogether extinguished, and as the lymph effused by the inflamed capillaries limits the extension of the lesion; and the whole phenomena are the same as in sphacelus from very acute inflammation.

28. *B. Powerful stimulants, irritants, and chemical agents*, produce gangrene somewhat differently, according to their modes of action on the living tissues.—Stimulants act more especially upon the nervous endowments of the part, and, by excessive excitation, exhaust them; but they cannot induce gangrene unless they destroy the vital properties of the capillaries; and they can effect this only by previously causing intense inflammatory action, the consequent gangrene being the effect rather of this action than of the stimuli which excited it, although the frequency, and, indeed, certainty, with which the result will follow the cause will much depend upon the kind of stimulus. Thus, both liquor ammoniac and spirits of turpentine will inflame the parts to which they are employed, but inflammation produced by the former will often pass into gangrene, and that caused by the latter will very rarely terminate in this manner.—The same remarks apply to irritants. These act more directly upon the capillaries, the gangrene being always a consequence of inflammatory action, in some one or other of its states, produced by them. Chemical agents, according to their nature, are often more complex in their operation; some of them both exciting the vital actions, and altering the intimate organisation of the part. Acids, alkalies, various neutral salts, the mineral and alkaline, &c. excite, and soon exhaust or extinguish, the vital properties of the parts with which they come in contact, with a rapidity, and to an extent, according to their concentration or activity. When much concentrated, especially alkalies and acids, they destroy the organisation of the part before its vital properties fully evince the effects produced upon them; the surrounding tissues, however, becoming inflamed, in consequence of the injury inflicted, and of the interruption of the circulation at the point where the obstruction of the vessels by the action of these agents commences. Alkalies produce gangrene very differently from acids. The former soften, dissolve, and combine with the ultimate organisation of the part, and render its fluids still more fluid; the latter constricts, corrugates, and condenses the

structure, and coagulates the fluids in it. Both ultimately destroy the intimate constitution of the solids and fluids, and thereby annihilate the properties or functions resulting therefrom; but in the different ways just stated. The surrounding parts become inflamed owing to the obstruction at the limits of disorganisation; the vascular action varying somewhat in degree, and perhaps also in kind, with the nature of the agent, the extent of injury, and the circumstances proper to the individual.—When sphacelation results—for sphacelation is the effect rather than gangrene, particularly when these agents are concentrated—the colour varies according to the agent and quantity of blood in the part on which it has acted. A lighter colour of the dead part is produced by alkalies than by acids; a dark brown or black hue following the latter, particularly when applied in a concentrated state to mucous or vascular tissues. Alkalies generally produce a greyish, yellowish grey, or ash colour of the parts which they destroy.

29. *C. Gangrene from Extremes of Temperature.*—*a. Excessive heat*, if it be no greater than 220° or 230°, vesicates the part, and produces gangrene by the inordinate excitement of the nerves of the part, and the consequent vascular action. Higher grades of heat excite the nerves and capillaries still more intensely, and exhaust their vital properties with greater rapidity, the containing sphacelus appearing more quickly and extending more deeply. In proportion as the temperature is increased, so is the consequent gangrene more entirely the result of the operation of heat, and less the effect of inflammatory action; the higher grades annihilating the vital properties, as well as destroying the structure of the part before reaction can take place in it. But, in most instances, unless death follow in a very short time, inflammatory injection and reaction in the surrounding tissues appear, and increase the extent of the gangrene and of the consequent sphacelus.—When the injury is not such as to occasion death in two or three days, the sphacelated part is separated from the living, and an abundant suppuration takes place from the living inflamed surface; but this seldom occurs in less than five or six days. The loss of substance is generally only partially repaired; a fibro-cellular tissue being formed, which contracts as it becomes more fully organised, occasions deformity, and interrupts the functions of the part.

30. *b. Intense cold* acts very differently from excessive heat in the production of gangrene. It affects chiefly the vital functions of the organ, and does not occasion disorganisation although it causes congelation of the fluids and soft structures. Gangrene seldom follows a diminution of temperature short of producing congelation, unless as a consequence of the inflammation intermediately occasioned. When the cold is great, the parts exposed to it, especially those furthest removed from the centre of circulation, have their vascularity diminished, and become pale, constricted, and numb. Motion and sensibility are afterwards lost, and the parts are even frozen in the more extreme cases. If the exposure to the cold continues, the congelation advances; the functions sink progressively, and a state of apathetic lethargy comes on, terminating in unconsciousness and death (see art. COLD). In this case, gangrene

is not developed. It is not until the frozen part is thawed, or exposed to heat, that gangrene is manifested. The vitality, reduced or extinguished by the diminution of temperature, cannot be restored in all the affected tissues. The blood becomes again fluid, but it has lost its crasis, and separates into serum and coagulum in the smaller vessels. Sensibility, motion, and animal life do not return. The skin covering the part assumes a livid or brownish red colour; phlyctenæ appear on its surface; with grey, purplish, or black spots, indicating the passage of the gangrene into sphacelus. The living parts closely adjoining the gangrene are now injected and inflamed; the vascular reaction which they experience exhausting the remaining vital properties, especially of the capillaries, and extending the mortification, as in gangrene from inflammation. In slight cases, although congelation may have taken place, the circulation and sensibility of the part is often restored; a tingling or pricking sensation is felt; reaction supervenes, and even becomes excessive; and, owing to previous reduction of vital power, and the consecutive action, exhaustion of the affected structure, followed by lost power of the capillaries, diminished cohesion of the tissues, coagulation or other change of the blood in them, and by gangrene, soon afterwards appears. In these cases, the external changes are altogether similar to those just described; but the extent of mortification depends upon the constitution of the patient, and the violence of the antecedent and attendant inflammation.

31. VI. GANGRENE FROM POISONS. — The poisonous substances to which attention will be here directed, are — 1st. Diseased vegetable productions; 2d. Diseased or decomposed animal matters; and, 3d. The poisons generated by certain animals. — A. *Gangrene from Diseased Grain* is sometimes seen among those who live chiefly on rye. Of the general effects of this and of other grains, when used in a diseased, unripe, injured, or mouldy state, some notice is taken in the article *FACORISM*. But the influence of *spurred rye* in causing gangrene requires a particular notice at this place. *Spurred rye*, when used with the sound grain as food, produces, according to the quantity, somewhat different effects — either *convulsive* ergotism, or *gangrenous* ergotism. But both these species of disorder may be associated, or the former may be followed by the latter, either of them existing in various grades: Indeed, the gangrenous disease is generally preceded, or even attended, by some degree of spasmodic affection.

32. A. *Gangrenous Ergotism* — *Necrosis ustulaginea*, SAUVAGS — *Gangrène des Solognois* — has been observed both sporadically and epidemically. It has been supposed that the epidemics which appeared in various parts of Europe during the middle ages, and were denominated *Ignis Sacer*, *Saint Anthony's Fire*, *Mal des Ardens*, &c., were occurrences of this variety of ergotism in a severe as well as epidemic form. The gangrene and separation of the limbs mentioned with respect to them countenance this supposition. It was not, however, until the epidemic of Illesse, in 1696, that the effects of spurred rye on the economy were fully recognised by physicians. In 1630, an epidemic gangrene appeared in Sologne, and was traced to this cause by THUILLIER.

Subsequent occurrences of this malady, in different parts of France, Switzerland, and Germany, have been described in connection with this cause, by PERRAULT, DODART, BRUNNER, NOËL, LANG, DUHAMEL, SALERNE, READ, and others. — The experiments performed by TISSIER in 1780, and the facts detailed by LANSON in 1818, have further elucidated this subject.

33. Gangrenous disease from the use of spurred rye generally commences with vertigo, faintness, diminished sensibility, and slight convulsive or spasmodic movements — with the chief symptoms of spasmodic ergotism. But it is sometimes not preceded by any of these. In this case, it is ushered in by lassitude and weakness of the lower extremities, with deep-seated pain, increased by heat, and aggravated during night. There are occasionally, at this period, slight swelling, but without redness; and, in some instances, even a wasting of the extremities. The temperature, motions, and sensibility, of the parts are afterwards lost, although the deep-seated pain still continues. The integuments now become wrinkled from the shrinking of the parts contained by them. Phlyctenæ appear on the surface; the skin assumes a violet, livid, or black hue — not, however, in all the places affected, but first in the heel, feet, or various parts of the thighs or legs. Sometimes the gangrene extends from the upper portions of the limbs to their extremities; or from the more internal structures to the integuments; and in other cases it proceeds from the toes upwards. When it reaches the trunk, and often before it advances so far, the patient sinks. It generally proceeds gradually, and is not limited to the lower extremities, the upper being often affected. When it is arrested, an inflammatory circle forms around the dead part; and, at the points of separation, an abundant and very fetid suppuration is established. — The gangrened portions are dry, hard, and shrunk. A whole limb may be thrown off in this state without the loss of a drop of blood.

34. Gangrenous ergotism seems, from the early effect produced by its cause upon the nervous system — from the spasmodic contractions, insensibility, weakness of mind, and fatuity, often accompanying it — to arise, in a great measure, from lesion of this system. The circulating fluids are evidently also deteriorated; the affection of the nervous system being probably caused by the change in the blood. Whatever that change is, it may be supposed to affect also the blood-vessels, particularly those most removed from the centre of the circulation. But the vessels, as well as the internal viscera of persons who have died of this disease, have not been investigated. In this state of ignorance as to the morbid appearances after death, several opinions have been hazarded as to the nature of the alterations which terminate in this manner. Some suppose that inflammation of the blood-vessels is produced; and others contend that the existence of inflammatory action is not indicated by the descriptions given by observers of the disease. Without the data furnished by the minute examination of the blood-vessels and nerves after death, all speculation as to the nature of the disease must be inconclusive.

35. B. *Gangrene from Diseased or Decomposed Animal Matters*. — Mortification may take place

from these causes in one or other of the following circumstances:—1st. It may result from the absorption of gangrenous or morbid matter from a different part of the same frame; in which case the consecutive gangrene is generally seated in some internal organ, as the lungs, spleen, liver, &c.—2d. It may follow the application of putrid or diseased matter to an abraded surface, or by puncture, as in dissection, wounds, &c.—3d. It may be occasioned by exposure of a wound or sore to foul air; or by the constitutional affection produced by the respiration of air loaded with decomposed animal matter, as in hospital gangrene:—and, 4th. It may follow the contact of a diseased secretion, either with or without abrasion of the cuticle. I shall consider separately gangrene occurring in each of these ways.

36. a. When mortification follows compound or other fractures, or amputations, inflammation, &c., a similar occurrence to that which I have noticed, when treating of abscesses (see art. Abscess, § 27.), may take place—a portion of the sanious fluid may be carried into the blood, and give rise to internal gangrene, without any appearance of previous inflammation of the consecutively gangrened part.—Upon examination after death, this part is found in some instances livid, brown, or black, in one or more circumscribed portions, and somewhat condensed, particularly if the lungs be the organ thus consecutively altered; and in others of a dirty grey or slate colour, and soft or pulpy. Occasionally this latter state appears to have been the advanced stage of the former.—In several cases, the diseased part is reduced to a sanious, or almost fluid condition; and changed to a reddish brown, or dark brown colour. In all these states, the surrounding tissues may not be at all changed; the gangrened portions varying in size and in number.—In these cases, the sanious matter, which has passed into the circulation, has induced congestion of a portion of an internal parenchymatous organ, and so impaired the vital properties of the congested capillaries, as well as of the organ itself, as to cause them to pass directly into a state of gangrene, without intermediate reaction of the vessels, either in the affected part or in the surrounding structures. The above states of *consecutive gangrene*; I have seen after sphacelation affecting the extremities, or parts pressed upon in low fevers, especially those covering the sacrum.

37. b. The application of putrid or morbid matter to an abraded or punctured part often produces a septic or contaminating effect, especially upon cachectic or previously disordered constitutions. Putrid vegetable or animal substances, and various morbid secretions, when thus applied, may occasion, in the first instance, erysipelas, or diffusive inflammation of the cellular tissue, quickly passing into gangrene. The wounds received in dissections, particularly of stale subjects, or of bodies dead more than twenty-four or thirty hours, are sometimes followed by gangrenous inflammation of the cellular tissue, attended by irritative or low fever. The disease, caused by wounds or punctures received in the examination of recently dead bodies, particularly those who have died in the puerperal state, or from inflammation of serous membranes, although much more dangerous than that which occurs in the

foregoing circumstances, is seldom attended by gangrene even in fatal cases (see Poisons—Animal); or if it be, this lesion is the least important part of the malady.

38. c. Wounds, injuries, and sores are not infrequently affected by gangrene in circumstances favourable to the contamination of the air, to imperfect ventilation, and to the production of humidity, in the apartments where persons thus injured are confined.—*Hospital gangrene* is most frequently generated in this manner; for, although the fluids of the diseased part will produce it, when they come in contact with an abraded surface, or possibly, even, when they are for any time applied to the sound skin, yet I believe that it is chiefly owing to the solution of putrid animal miasms, in the humidity of the surrounding air, that the disease is communicated in the wards of an hospital. Hence the mischief of wetting the floors of wards too often, when numbers are confined in them with injuries, &c., as respects the production both of erysipelas and of gangrene.—I am of opinion, that the close and foul air generated by the discharges from suppurating or gangrenous surfaces, will favour the production of gangrene, in injured parts, by lowering vital power and deteriorating the circulating fluids; and thereby inducing a state of system similar to that in which putro-adynamic fever originates, or by which it is characterised.

39. When *hospital gangrene* commences in a sore or part with which the foul air comes in contact, it is evinced by a change of colour, which, however, differs in different cases. In some, it begins with a certain degree of pallor, and the exudation of a dirty, pale grey matter, occasionally interspersed with specks of blood. In other instances, it presents a livid hue; and, in nearly all, it is swollen and painful. The surrounding parts soon undergo similar changes: the integuments have an erysipelatous appearance, and, with the subjacent cellular tissue, are soon converted into spongy, dirty grey sloughs. The separation of the sphacelated parts is generally attended by an exudation of blood, or by more copious hæmorrhages, owing to the adynamic state of constitution preventing the inflamed part from forming coagulable lymph, whereby the extension of the gangrene may be limited, and the hæmorrhage prevented. The state of asthenia or putro-adynamia, produced by the causes just named (§ 38.), favour the extension of the mortification, the further contamination of the blood, and the recurrence of hæmorrhage. When a considerable vessel is destroyed, the absence of coagulable lymph gives rise to losses of blood, which further sink the patient; and a recourse to the tourniquet, in order to arrest the bleeding, until the vessel is tied, accelerates the death of the limb, which soon becomes swollen, completely sphacelated, and intolerably offensive.*

* Mr. COPELAND HUTCHINSON, in a most instructive chapter on Hospital Gangrene, in his *Surgical Observations*, details a case of a man, who had been the subject of extensive exfoliation of the left parietal bone, exposing the dura mater to the extent of two square inches and a half, and who was infected by hospital gangrene of the exposed part. In about three days the dura mater was destroyed, and the brain itself attacked. The brain came away broken down in its structure, as if it had been mixed with dark coloured vinegar, and emitted a disagreeable sour gangrenous smell. The man lost half a teaspoonful of brain before fever and delirium came on. He died on the

40. *d.* The morbid fluids and secretions of several of the lower animals often produce very serious effects when applied to the denuded surface, or even to the sound skin; and these effects are generally attended or followed by gangrene of the part with which they come in contact. The occurrence of *Malignant Pustule* (see the article) is an illustration of this fact. The application of the blood or raw flesh of a diseased animal to a part will often occasion gangrenous inflammation of it, although the flesh of these animals may be eaten with impunity when cooked. Of this, various instances have been adduced by MORAND, DUPUY, LEURET, HAMONT, and others. I believe that, in all cases of the production of gangrene by morbid secretions and other fluids—whether of the lower animals or of man—the local as well as the constitutional effects produced by them are most virulent, when they either proceed directly from the living animal, or act very soon after death; and that they are less injurious when they have undergone the changes constituting incipient putridity or decomposition.

41. *C. Gangrene from poisons generated in healthy animals*, as in the viper, rattlesnake, &c., commences and proceeds with amazing rapidity, upon insertion of the poison, and with remarkable depression of the vital manifestations of the constitution, as well as of the part thus inoculated. The insertion of the poison induces intense pain, which rapidly extends; swelling and hardness of the cellular tissue; dark redness at the point of injury, soon followed by a spreading livid discolouration; and diminution of temperature.—The skin is rapidly covered by phlyctenæ; the cellular tissue becomes soft, and crepitates on pressure; and the puncture discharges an offensive sanious fluid. Almost immediately upon inoculation of the poison, and co-ordinately with the rapidity and extent of the local action, an intense effect is produced upon the whole frame (§ 50.).

42. *II. OF THE CONSTITUTIONAL SYMPTOMS OF GANGRENE.*—The states of vital manifestation throughout the system, vary somewhat in each of the forms and circumstances, in which gangrene and sphacelus appear. I shall, therefore, take a very brief view of those which are usually seen in most intimate union with each of these forms.—*A. Mortification from inflammation* presents no uniform relation to the severity of the local action, or of the sympathetic constitutional disturbance, although such relation obtains in a general way.—Inflammation of much intensity, in a constitution previously debilitated, or in a habit of body already cachectic, or during a deteriorated state of the circulating fluids, is always more or less liable to terminate in gangrene. Its occurrence also, in a highly sanguine, irritable, and plethoric state of the system, particularly when this state has been induced by living highly, or by the excessive use of intoxicating liquors, is a no less unfavourable circumstance; and, equally with the foregoing liabilities, should be taken into account when symptoms indicative of this termination appear. In the former class of occasions, in which gangrene may occur, the

inflammation, although slight or limited, may nevertheless be excessive, relatively to the state of vital power and of resistance to injurious impressions or actions: in the latter, there is always a disposition to intensity of action so great as to quickly exhaust the vital properties of the vessels; if this intensity be not promptly reduced, and the consequent exhaustion either anticipated or promptly met by local or general means appropriate to the peculiarities of the case.

43. To detect the commencement of gangrene in any internal viscus is by no means so easy as it has been represented by many writers, who, merely copying or compiling from one another, have thereby often perpetuated error. The *sudden sinking*, so often insisted upon, attends various other pathological conditions besides gangrene; and, even when it is observed in connection with this lesion, it may be the attendant of that change in the state of vital power, of which gangrene is only one of the remote consequences.—When this symptom appears somewhat suddenly, it indicates one or more of three states;—*a.* It may depend upon the depression of organic nervous power, generally as well as locally;—*β.* It may arise from commencing gangrene;—*γ.* And it may be caused by the passage of morbid or putrid matter into the blood. The *pulse* varies on the accession of gangrene, with the previous grade of local action and of attendant fever. When action has been very high, the pulse retains its frequency, but becomes weak, small, soft, and very compressible, and ultimately irregular, intermittent, or even slow, just before death. When there has been but little previous fever, the pulse is very feeble, undulating, unequal, intermittent, and slow; but it is readily affected, in either case, by mental or physical impressions. The *animal heat* sinks rapidly with the pulse when gangrene supervenes; the extremities becoming cold, and the surface covered with a clammy perspiration or sweat, which is cold and raw as dissolution draws near. If the antecedent symptomatic fever have been slight, the *mind* may be undisturbed to the very last; if severe, delirium, picking at the bed-clothes, stupor, coma; accumulations of mucous sordes on the tongue, teeth, and lips; fætor of the breath, and even of the body; and unconscious evacuations, for a longer or shorter time before death, are not infrequent.

44. Besides these, various other symptoms appear, but without any uniformity or constancy. These are, faintness or syncope, particularly when the head is raised; hiccup; vomitings, sometimes without severe retchings, or a passive rejection of matters from the stomach; a peculiar gangrenous odour exhaled from the body, and from the excretions; a sunk, collapsed, pinched, and cold state of the features; a dusky, lurid, and sometimes a jaundiced, appearance of the skin; tympanitic distension of the abdomen; offensive eructations; an emphysematous state of parts; wandering delirium, especially at night, or various passing delusions; tremblings or shudderings; and restlessness, or laborious hurried respiration. An offensive gangrenous odour of the expired air is very remarkable when gangrene occurs in the lungs; but it may accompany this lesion in any other part, if a portion of the morbid or decomposed matters pass into the circulation. In this case, all the excretions—pulmonary, cutaneous,

10th day from the attack of the gangrene. The whole of Mr. C. HUTCHINSON'S observations on this disease are results of most extensive experience, and are very interesting.

intestinal, and urinary — will be rendered more or less offensive, and they may even exhale a gangrenous or putrid factor.

45. *B.* In mortification from debility, or from deficient or unwholesome food, not only are the vital manifestations generally impaired, but the fluids and solids also are frequently in a state of obvious disease, before gangrene occurs, particularly in low fevers, scurvy, &c. In such cases, the general adynamia, as well as the deterioration of the fluids and solids, are rapidly augmented with the accession of this lesion, and most of the symptoms already noticed are also superadded. The pulse, temperature, and mental powers are affected in the manner just described. The previous and attendant asthenia, and the consequent alterations in the blood — which is incapable of coagulating, as it escapes from the diseased part — favour the recurrence of hæmorrhage, the extension of sphacelation, and the further contamination of the fluids from the transit of putrid matters into the circulation, by preventing the formation of coagulable lymph. The more obvious effects of these states are, accelerated sinking of the vital functions, offensive diarrhoea, and various other contingent phenomena, mentioned above (§ 44.), as indicating approaching dissolution. — When inflammation of the nerves seems connected with the production of gangrene, great pain, high irritative fever, watchfulness, &c. precede the sinking, irritability of stomach, and weakness or irregularity of pulse, attendant upon this change.

46. *C.* When obstructed circulation in the arteries occasions gangrene, the symptoms depend very much upon the cause of obstruction. — *a.* If acute arteritis (see ANEURISM, § 27. *et seq.*) produce it, severe inflammatory or irritative fever precedes it, and, on the accession of it, changes into fever of a lower type; watchfulness, sometimes delirium, and most of the symptoms already noticed, supervening. — *b.* When ligation or rupture of an artery causes gangrene, the constitutional affection is not severe at first; but in two or three days, or in a shorter time, fever of a low type appears, with more or less disturbance of the nervous system, occasionally with delirium, discolouration of the general surface, and sinking of the vital powers, until either dissolution follows, or restoration and separation of the gangrened part takes place. — *c.* In cases of gangrene from ossification and obstruction of the arteries, the constitutional symptoms increase slowly until they ultimately indicate great prostration of the vital powers. In some instances, the progress is at first slow, and afterwards very rapid. In an early stage of the gangrene, slight irritative fever is sometimes observed; but discolouration of the surface, diarrhoea, sinking, hiccups, irritability of stomach, and the other usual attendants on sphacelation, afterwards appear; the progress of the constitutional affection being seldom arrested, or the separation of the dead parts effected.

47. *d.* Whatever peculiarity gangrene from obstruction of the veins presents as to the constitutional symptoms, belongs entirely to the nature of the obstruction. — If inflammation of the veins have occasioned it, the symptoms, local and general, of phlebitis will have preceded it, and the advanced phenomena will not differ from gangrene consequent upon internal inflammations,

excepting that the powers of life will be more disposed to rally, and to separate the dead from the living parts. — Gangrene caused by pressure upon the veins, often takes place without any previous or attendant febrile action; the vital depression and other symptoms of this lesion supervening upon the congestion, serous infiltration, &c. more immediately produced by the obstruction. — *e.* Internal strangulations, however, and intussusceptions of a portion of the intestinal canal, give rise to a different train of symptoms. In these, the pressure acts also upon the nerves and arteries; and the exquisite pain and tenderness, irritative fever, restlessness, and vomitings, followed by cessation of pain, by singultus, eructations, faintness, cold sweats, extreme weakness of pulse, &c., indicate the accession of gangrene. — *f.* Interrupted circulation through the heart, occasioning gangrene, is not preceded by febrile symptoms: the constitutional changes in this variety at first depend upon the disease of the heart, and become subsequently associated with those arising from impeded circulation of blood in the veins, serous infiltration, and the consequent pressure and gangrene. The progress of the local and constitutional affection is slow, but sometimes rapid at an advanced stage.

48. *D.* — *a.* The action of heat upon the constitution in producing gangrene, is proportioned to the violence and extent of local injury. — Excessive burning pain, hard pulse, thirst, and the usual attendants upon symptomatic inflammatory fever, follow the less violent injuries from this cause, heighten the local inflammation, and exhaust the vitality of the affected vessels. When gangrene is about to occur, or has supervened, the fever changes to the nervous form, often with delirium or mental agitation, followed by stupor, or convulsions when children are the subjects of this injury. In very severe burns, or where a very large surface has been scalded, those latter symptoms immediately follow the shock sustained by the constitution, from the extensive local injury inflicted; and often terminate fatally in a period varying from a few hours to two or three days. The severity and character of the constitutional affection, however, vary with the state of the patient and the situation of the cavity. When the injury is over the great cavities, its effect is much more severe, *ceteris paribus*, than on the extremities.

49. *b.* Gangrene from cold is often attended by very slight constitutional disorder, when only the extremities have been exposed or affected, or when the cause has been removed soon after these parts had become benumbed or frozen. But when the whole body has been exposed to cold, particularly in a state of repose, or when the exposure has continued long after these effects have been produced, lethargy, stupor, insensibility, frequently passing into death, generally supervene in succession. It is when local inflammation or reaction appears, in the previously benumbed or frozen part, or in the living tissues adjoining, that fever takes place. But as soon as the inflamed part becomes gangrenous, the fever assumes the nervous character. In this variety, however, as well as in that from burns, the degree of consequent adynamia depends very much upon the previous state of the patient, physically and morally; upon the severity of the injury; and upon the extent

of the gangrene, and the rapidity of its accession and extension. Where want, improper food, and intemperance have already produced their effects on the frame, the constitutional commotion attendant upon the injuries produced by the extremes of temperature, generally presents more of a nervous character throughout, than in other circumstances, with a rapid, small, weak and irregular pulse; and frequently with tremor, delirium, or even both, or with more or less agitation. — *c. Chemical agents* affect the system chiefly by the inflammation they excite in the part to which they are applied; unless the injury is extensive or violent, when the symptomatic effects will nearly resemble those caused by extensive burns (§ 48.).

50. *E. Gangrene from poisons* is always preceded and attended by severe constitutional affection. — *a. That occasioned by spurred rye* is generally preceded by lassitude, faintness, weakness of the senses, vertigo, spasms, and symptoms of general adynamia, manifested both in the vital and animal functions. Sleep is prevented, by the severe pains in the limbs. The powers of mind are generally impaired; and, with the appearance of gangrene in the extremities, all these symptoms are increased, until the patient sinks into insensibility, or dies in a state of syncope. — *b. Gangrene from putrid or diseased animal matters* is preceded, as well as attended, by the severe constitutional effects, described in the articles on *Diffuse Inflammation of the CELLULAR TISSUE*, *ERYSIPELAS*, *Malignant Pustule* — either of which may be produced by these matters — and more fully elucidated in those on *Putro-adyamic Fever*, and *Animal Poisons*.

51. *c. Hospital gangrene* is always attended by adynamic fever; and, in the circumstances alluded to above (§ 38.), it is often preceded by more or less depression of nervous and vital power, although rarely by prominent febrile symptoms. Derangement of the digestive functions, sometimes diarrhoea, a quick and feeble pulse, and physical and mental depression, generally usher in, and attend, the early progress of this gangrene. Dr. HENNEN states, that men who had borne amputation without a groan, shrunk at the washing of their sores, shuddered at the sight of a dead comrade, and even predicted their own dissolution, sinking into sullen despair. Towards a fatal close, prostration of all the vital manifestations, faintings, diarrhoea, vomiting, hiccup, delirium, discolouration of the general surface, insensibility, coma, cold clammy sweats, involuntary evacuations, &c. successively appear.

52. *d. The poisons of reptiles* occasion a sense of sinking at the epigastrium, oppression in the præcordia, laborious breathing, vertigo; pains in various parts of the body, particularly in the stomach, bowels and head; vomitings, diarrhoea; impaired vision and sensation; with a small, feeble or intermittent pulse. To these succeed, extreme sinking and anxiety at the epigastrium and præcordia, great thirst, syncope, singultus, offensive foetid breath, a jaundiced or sallow state of the skin, coldness of the extremities and of the general surface, clammy sweats, insensibility, and death, unless the progress of vital depression be arrested by the most energetic means.

53. III. PROGNOSIS. — The prognosis, although generally unfavourable, varies with the different circumstances in which gangrene presents itself; and the extent to which it has proceeded. — *a. Gangrene consequent upon inflammatory action* is commonly fatal when an internal organ is affected, especially when the general excitement suddenly subsides, the pulse becoming quickly feeble, small, or thready; the features pinched or collapsed; the surface luid, sallow, or livid; the respiration laborious or difficult, and the perspiration or other excretions foetid and gangrenous. Singultus, rejection of the contents of the stomach without effort, syncope, and involuntary evacuations, are indications of the near approach of dissolution. But all these phenomena are often manifestations merely of that state of local and general derangement, of which gangrene is the immediate result, rather than of gangrene itself — at least of gangrene to any extent; for dissolution may take place before this lesion is fully developed. — When this form of gangrene is external, its extent is less an indication of danger, than the character of the constitutional disorder, and the disposition evinced by this lesion to extend. — In all cases, the habit of body, the age, modes of living and previous health of the patient, and the exciting cause and character of the previous inflammation, should be taken into account. If these are favourable, if vital action be not very depressed, and if a disposition to form coagulable lymph and to arrest the disease appear, recovery may be expected.

54. *b. Gangrene from debility, from disease of the nerves, and from obstructions of the arteries or of the veins*, should receive a guarded, if not always an unfavourable, prognosis; for, in these circumstances, although some cases may recover, the great majority will terminate fatally. When it occurs from ossification and obstruction of the arteries, or from disease of the heart, a fatal result will surely follow; although it may be deferred for some time, in a few instances. — *c. When it is produced by any of the more common physical agents* noticed above, a much more favourable event may be anticipated, unless the intensity of the cause, and the extent to which it has acted, have given a very severe shock to the system, have depressed vital power beyond the ability of resistance, and induced low nervous fever with cerebral affection.

55. *d. Gangrene from the use of spurred rye* requires a cautious opinion as to the result; for when the disease produced by this agent has given rise to this alteration, matters will frequently have gone too far to admit even of amelioration. — Nor is the prognosis very different, when the deleterious effects of any of the *animal poisons* mentioned above have become so manifest as to be attended by gangrene. The most energetic means alone can then arrest the progress to dissolution; and these may be rejected from the stomach, or fail, even when retained, of rallying the powers of life. In every circumstance in which gangrene occurs, irritability of the stomach is a most dangerous symptom. — In *hospital gangrene*, however, removal of the patient to a pure air, and an appropriate treatment, at an early stage of the disease, will be attended by success, in the majority of cases.

56. *e. Of all the circumstances that should be*

taken into consideration, in forming a prognosis, none is of greater importance than the disposition evinced by the surrounding parts to limit the extension of the gangrene by the formation of coagulable lymph. This should be viewed as a most favourable occurrence, particularly when the local alteration has not proceeded very far, nor depended upon disease of the heart, as it indicates restoration of vital power, and consequent vascular reaction, whereby the injury may be arrested and partially repaired.—On the contrary, spreading of the gangrene is most unfavourable—1st. As producing a greater extent of exposed surface and of injury by which the constitution will be injuriously impressed;—2d. As arising from progressive sinking of vital power;—and, 3d. As favouring the passage of a portion of the dead or morbid matters of the sphacelated part into the circulation, and the consequent contamination of the whole frame,—circumstances exerting a most powerful influence in hastening a fatal result, especially if asthenic inflammation, general adynamia, or an animal poison, have occasioned the gangrene.

57. 1V. TREATMENT.—i. The means of cure in gangrene refer—*first*, to the removal of the pathological condition which occasions it; *secondly*, to the state of vital action in the vicinity of the dead part; and, *thirdly*, to the state of constitutional disturbance.—A. If gangrene have been caused by *inflammation*, especially if it have proceeded to sphacelation, the state of constitutional power will then have become so far impaired after the more sthenic forms of inflammatory action, and so much the more reduced after the asthenic, as to require a very different mode of treatment from that which would have been quite appropriate, before the gangrene had taken place.—a. Although the part is about to pass, or has just passed, into gangrene, after the more sthenic states of inflammation, *bloodletting* may still be practised, but with caution, particularly in robust or plethoric persons, or when the pulse still continues hard or strong, or when the gangrene is external. In these circumstances, excessive vascular action, if not subdued by a moderate depletion, would exhaust the remaining power of the vessels of the part or of the surrounding tissues; and the extension of the lesion would be thereby caused with as great rapidity as in cases characterised from the commencement by deficiency of power. It is very different, however, when the gangrene has followed the more asthenic states of inflammation, or occurred in persons living in unhealthy situations and in very large cities; or when it has appeared in the dissipated and intemperate. Bleeding cannot be resorted to in these circumstances, and even lowering *purgatives* should be avoided. Yet recourse to purgatives is indispensable; the warmer or more restorative kinds, or a combination of them with tonics, being most appropriate.—In some instances, particularly when biliary collections may be presumed to have formed in the gall bladder or ducts, and when the part is merely in the incipient stage of gangrene, an *emetic* will precede the exhibition of a purgative with much benefit, especially in autumn.

58. b. It is principally when gangrene has just commenced, and been caused by the more acute forms of inflammation, in young or strong persons,

that the *antiphlogistic regimen* should be prescribed; or, whilst the pulse still retains tone, and the surface presents an increase of temperature, the local change not having yet become associated with a general diminution of vital power. In this state, *diaphoretics*, conjoined with *opium*, or other *anodynes*, are also of much service, particularly after morbid secretions and fecal accumulations have been freely evacuated by purgatives. They equalise the circulation, and, if judiciously selected, they improve the state of the blood; whilst the narcotic allays the morbid sensibility of the nerves of the part, and the general irritability of the system attending the early progress of this lesion. The nitrate of potash, subcarbonate of soda, with the spirits of nitric ether, and tincture of opium or of henbane, may, therefore, be prescribed in the camphor mixture, if the temperature of the skin continues above natural; or the same medicines may be given in the decoction of bark, or in the infusion of valerian, if the heat of skin be somewhat less. When the abdominal secretions are morbid, two or three grains of calomel, with as many of James's powder, may be taken at night, and a stomachic aperient the following morning, the solution of the acetate of ammonia, with the acetate of morphia in camphor mixture, or any aromatic water, being used during the day.

59. c. Internal gangrene is very rarely attended, even at its commencement, by a state of vascular action, requiring antiphlogistic remedies. It is chiefly when gangrene follows local injuries, in robust constitutions, and violent inflammation, or when it is attended by considerable excitement, that the above or similar measures are necessary. In other circumstances—as when it is consequent upon asthenic action, or when the antecedent inflammatory fever has assumed a lower grade—the treatment ought to be different or modified according to the states of action and of vital power. Surgical writers on gangrene, even up to the present time, have concerned themselves chiefly with the external manifestations of this lesion, without sufficient reference to the states of vascular action and of vital energy—to the changes in the organic nervous influence, in the circulating fluids, and in the abdominal secretions, which both favour its occurrence, hasten its progress, and modify its conditions. Hence the treatment of it has been viewed by them in a one-sided and an imperfect manner. Instead of agitating the question, as they have done even for ages, as to the propriety of bleeding, or of giving bark, at the commencement or during the progress of this lesion, they should have endeavoured to ascertain, if they did not know; and they should have informed us, if they knew; the circumstances requiring the one or the other, and the stages in which either ought to be employed. It is a matter of some astonishment to see practical writers of the present day differing so widely on this subject as they do—some prescribing bleeding, others cinchona, and many condemning all things besides their own methods or medicines, without considering the pathological states, for which either mode of treatment is most appropriate. The most important means of cure—whether bleeding, stimulants or tonics, amputating, external applications, &c.—have been

recommended for gangrene without sufficient reference to the states of vascular action and of vital power; or to the effect either of them may produce upon these states, and upon the disposition to limit or to extend the local disease; or to the influence they may exert in favouring the contamination of the circulating fluids, or in depurating the blood, and in promoting the functions of the principal secreting and excreting organs.

60. *d.* If the pulse be weak or soft, and the skin cool or moderately warm, the preparations of cinchona, serpentaria, and the muriate of ammonia; or the sulphate of quinine with camphor or ether; or the infusions of cascarrilla, or of valerian, or of calamus aromaticus, with the chlorate of potash and chloric ether, will be requisite. At the same time, the excretions should be promoted by stomachic purgatives, as the compound infusions of gentian and senna, with the alkaline subcarbonates, and ammonia. — In a case which was ably treated by Mr. MORLEY of New Cavendish Street, to which I was called, this treatment was immediately efficacious. When diarrhoea is present, opium should be added to these tonics; or the chlorate of lime may be prescribed. In cases where the attendant inflammatory fever is about to pass into the nervous or putro-adyamic states especially if the gangrene have gone on to sphacelus, the exhibition of these, or of other tonics and stimulants, should not be delayed too long, otherwise the adjoining vessels may not be enabled to exert that degree of sthenic action requisite to the formation of coagulable lymph, whereby the extension of the lesion may be limited, and the absorption of morbid matters and the consequent contamination of the blood prevented. The stomach may become so irritable, when vital depression is not arrested sufficiently early, as not to retain the medicines most likely to be serviceable. This occurrence should be as far as possible prevented, as being most dangerous in itself, and as favouring the passage of morbid matters into the circulation. When it has appeared, I know nothing more efficacious in diminishing it than ammonia, large doses of Cayenne pepper, and opium, generally combined, and given in the form of pill. Warm wine and water, or brandy and water, with Cayenne, or other hot spices; or the acetate or muriate of morphia, with aromatics, may likewise be employed. Upon the whole, inflammatory gangrene, at an advanced stage, or gangrene consequent upon asthenic inflammation, or attended by the usual symptoms of adynamic fever, requires a very similar treatment to that which I have advised in the advanced periods of *Putro-adyamic Fever* (see that article).

61. *B.* The constitutional treatment of *gangrene from debility and deterioration of the circulating fluids* (§ 16.) consists chiefly in the exhibition of tonics and stimulants; of the chlorates of potash, and of soda; of camphor, musk, and ammonia, with opium and capsicum; and of the other restoratives mentioned above (§ 60.); and differs in no respect from that advised, in diffusive inflammation of the cellular tissue, in the adynamic states of *erysipelas*, and in the typhoid forms of fever.

62. *C.* When disease of the nerves threatens the production of gangrene, the morbid sensibility

usually present requires the exhibition of opiates in large doses, frequently with camphor, or ammonia, or the subcarbonates of the fixed alkalies and warm aromatics. Even on the threatened accession of this lesion, local depletions may be still required. Purgatives are generally beneficial. Warm anodyne fomentations may be applied to the limb, at this period; and the other external remedies of which mention will be made hereafter should be afterwards employed, particularly if the part pass into sphacelation. In other respects, the treatment should be conducted conformably with the principles developed above.

63. *D.* The treatment of *gangrene from obstructed circulation*, through either the vessels, or the heart, depends much upon the seat and cause of obstruction. — If inflammation of the arteries and veins be concerned in producing it, the means of cure ought to have reference to the states of vascular action and of vital energy, as in gangrene from inflammation; but, in respect to phlebitis especially, vital power and resistance should be so liberally supported, as to enable the vessels to form coagulable lymph, in order to limit the extension of the lesion, and prevent the contamination of the fluids. — When it is caused by *strangulation of, or pressure upon, the veins*, the treatment must entirely depend upon the states of vascular action and of vital power. The former ought not to be allowed to continue high, nor should the latter be permitted to sink, without having recourse to means to support the one, and to lower the other. — For senile gangrene, or that arising from *ossification of, and impeded circulation in, the arteries*, little beyond palliation of the urgent symptoms can be effected. The same remark applies to that caused by *disease of the heart*. Opium or the salts of morphia, either alone or conjoined with camphor, musk, ammonia, or similar substances; the alkaline subcarbonates, or the sub-borate of soda, with anodynes; tonics, antispasmodics, or stimulants, conjoined with these; attention to the digestive and excreting functions; the horizontal position; and farinaceous or milk diet may be severally employed in both these forms of gangrene.

64. *E.* *Gangrene from physical agents* should be treated according to existing states of local and general action and of vital power, which have been shown above to differ very materially according to the severity, seat, and duration of the injury. — That caused by *burns* requires bloodletting, if the vascular excitement be great. But action, in these cases, although high, is seldom attended by much power. Therefore vascular depletion should be practised in moderation and with caution; the nervous excitement and irritability of the system requiring the chief attention; for, if allowed to proceed, they increase remarkably the severity and extent of the local injury. When the shock sustained by the constitution has been severe, depletions will be injurious. In these cases, restoratives ought to be administered, generally with opium or other anodynes. These latter are required, in most cases, and they should be aided by such local means as will allay the painful heat and sensibility of the part. In severe injuries of this kind, the alarm of the patient, and the excitement directly produced by them, commonly occasion an appear-

ance of vascular reaction, which may mislead: but it generally subsides in a short time, especially if a full dose of opium is administered. When febrile action appears at a later period — after the immediate shock and alarm have subsided — and is symptomatic of the local inflammation, general or local depletions, purgatives and diaphoretics are then necessary. — The internal treatment of gangrene produced by cold, as well as of that caused by chemical agents, should be directed conformably with the principles already stated.

65. *F. Gangrene from poisons* requires more, perhaps, than any other form of this lesion, the use of internal remedies. — *a.* That occasioned by *spurred rye* is evidently connected with a deteriorated state of the circulating fluids, the affection of the nervous and vascular systems being consequent upon this state. Therefore the means of cure should be directed to the removal of this condition; and those already mentioned (§60, 61.) may be tried with this intention; especially the combination of the chlorides, with antispasmodics or tonics and narcotics. The opinions of writers who have had some experience in the treatment of this disease are very contradictory. Some advise emetics, bloodletting, and antispasmodics; others, narcotics and antispasmodics; and many, stimulants and tonics. This diversity is most probably the consequence of the different effects produced by the same means of cure, in successive stages of the complaint; and in epidemics presenting somewhat different characters; the changes thus arising obviously requiring a modified treatment. The means, however, which I have here suggested, or camphor, opium, and the alkaline subcarbonates, seem most deserving of confidence in this variety, particularly if aided by frictions, warm stimulating fomentations, and the warm bath, the alkaline carbonates or common salt having been dissolved in the water. The patient's strength should be supported by light, nourishing, and wholesome food.

66. *b.* The gangrene produced by *animal substances*, in a state of disease or of decay, should be treated very nearly as recommended in the articles on *Diffusive Inflammation of the CELLULAR TISSUE*, and on the adynamic state of *ERYSIPELAS*. The therapeutical indications are the same, namely, to excite and support vital power, and to allay irritability, and thereby to prevent the extension of disorganisation, by enabling the vessels to form coagulable lymph. With these intentions, combinations of tonics, antiseptics, and anodynes are resorted to, especially after morbid secretions have been evacuated by stomachic purgatives, and by enemata; and camphor, capsicum, and the acetate of morphia are prescribed, when nervous excitement or vascular irritability are very prominent. Ammonia, musk, chlorate of potash, sulphate of quinine, and warm aromatics, or spices, are generally beneficial; and may be given in various forms of combination, and in conjunction with opiates, according to the peculiarities of the case.

67. *c. Hospital gangrene* is the most common variety, and therefore the most important, of this species of disorganisation: in none has a greater difference of opinion existed as to the most appropriate method of cure. It is obvious that a *prophylactic* and *curative* treatment should be based

only upon a correct idea of the causes, in the various circumstances in which this formidable malady presents itself. These causes are — 1st. A cachectic and debilitated state of constitution, generally connected with disorder of the digestive canal and liver; — 2d. A low, humid, and miasmatic atmosphere, and a damp, and an ill-ventilated place of residence; — 3d. Insufficient or unwholesome food, and the use of impure water. — 4th. An air loaded with putrid miasms or animal exhalations, as that of crowded hospitals, camps, ships and transports; — and, 5th. The contact of animal matter or of diseased secretions or discharges, as in using unclean sponges, &c. From what I have seen of the disease, in foreign hospitals, soon after the last war, I infer, that, although the fourth and fifth of these are the most common exciting causes, the others are often more or less influential, either in predisposing to it, or in directly producing it, especially after severe injuries and operations, or when aided by the depressing passions; and that the causes commonly giving rise to typhoid or putro-adynamic fever will often occasion it, especially in crowded surgical wards of hospitals.

68. *a.* The opinion of DELPECH as to the origin of this form of gangrene, which is very nearly the same with that which I have now advanced, has been called an "irrational conjecture, quite destitute of truth," by Mr. S. COOPER. M. DELPECH's views are derived from extensive and diversified observation, in both civil and military hospitals, and are neither irrational nor destitute of truth. It surely is not becoming to condemn with harsh censure what cannot be answered by sound argument. Many of the surgical writers upon this malady have hardly looked beyond the local origin of it; and have limited their curative measures too strictly to the gangrened part. Others have, with greater justice, relied on constitutional treatment, without, however, neglecting such local means as have been found serviceable. The utmost diversity of opinion also exists as to what internal and external remedies are most beneficial. The very inefficient and inappropriate medicines but too often used internally by surgeons in this disease, have proved a principal cause of their distrust of this method of cure; for whenever the expected result did not follow from the means employed, the cause of failure was not attributed to such means, but to the nature of the malady. It is a matter of astonishment that, with all the reverence with which the doctrines and practice of JOHN HUNTER have been viewed, the most important of both have been very generally neglected, in the treatment of this and other external lesions connected with constitutional disorder. This able man stated, as axioms in pathology, that a certain degree of vital tone or energy is requisite for the formation of coagulable lymph, by which the spreading of inflammation and sphacelation will be prevented; that where, owing to deficiency of vital energy, vascular action is incompetent to the formation of coagulable lymph, these lesions will extend, and the morbid fluids will contaminate the surrounding tissues; and that, in order to avoid these consequences, means should be used to increase the vital power of the vessels in the diseased part, and thereby to enable them to form coagulable lymph, by which disorganisation will be arrested. Although the

state of the circulating fluid is overlooked in these views, yet they are correct in the main, and form the basis of a rational and successful practice in this and several other maladies.

69. *B.* Before I proceed succinctly to state the practice I would recommend conformably with these opinions, and with the results of observation. I shall briefly notice the constitutional means advised for this disease by some experienced writers. On the first manifestation of hospital gangrene, *emetics* are recommended by POUTEAU, DUS-SAUSSEY, BRIGGS, THOMSON, and HENNEN, and are evidently of service, at this period, when there are signs of biliary derangement. — *Bloodletting* is considered injurious or productive of little benefit by BLACKADDER, THOMSON, and BOOGIE, whilst Dr. HENNEN and Mr. WELBANK consider that moderate depletion is serviceable early in the attack, and in strong plethoric persons; and that the risk of the disease attacking the laeet-wound may be prevented by accurate closure, and by allowing the bandage to remain undisturbed until the cicatrix is completely formed. — *Purgatives* are directed by Dr. BOOGIE and other writers, but they should be warm and stomachic, or conjoined with tonics, stimulants, or aromatics, and exhibited early in the disease. It is chiefly after morbid secretions have been evacuated by the early exhibition of emetics and purgatives, that advantage from tonics and stimulants will be most apparent; and it is probably from an insufficient attention having been paid to this circumstance, that so much difference of opinion exists as to the propriety of using these latter remedies.

70. *Cinchona* alone, or in various states of combination, is praised for its good effects in this disease by BOYER, and numerous experienced writers, whilst HENNEN and WELBANK considers that it is injurious. It is recommended in conjunction with the alkaline subcarbonates by VAN WY, and SAVIARD; and with camphor, by FLAJANI. — *Camphor* is much used in this form of gangrene by Continental practitioners. POUTEAU, CONRAD, WENZEL, and ONYD prescribe it in large doses. I have seen much advantage derived from it; but I prefer to give it in the forms of combination to be mentioned hereafter. — The *arsenical solution* is directed by OTTO. It may be employed in similar states of constitution, to those in which cinchona or sulphate of quinine may be prescribed. — *Arnica*, *cascarilla*, and various other stimulants and aromatics are recommended by various authors, but they are useful merely as adjuvants of other more active means. — *Acids* are noticed in favourable terms by Mr. S. COOREN, and several other writers; but I have much doubt of any benefit being derived from their internal use. The *hydrochloric* and *nitric acids*, or a combination of both, promise most advantages of this class of medicines. — Of the propriety of exhibiting *opiates* there can be no doubt; and most writers agree on this point, and differ only as to the period of having recourse to them. Dr. THOMSON prefers them in the form of Dover's powder.

71. *y.* From observation of the results of different modes of practice in hospital gangrene, rather than from my own active experience, I would advise the adoption of a practice consonant with the views stated above. Having evacuated morbid secretions and fecal accumulations by emetics and warm stomachic purgatives, and di-

rected a small or moderate bloodletting, in such cases only as are attended by excessive action and signs of plethora, I would advise the decoction of bark or the sulphate of quinine, in modes of combination appropriate to the peculiarities of the case. If vascular action continue very much excited, the decoction of bark may be conjoined with the nitrate of potash, the solution of the acetate of ammonia, and the spirits of nitric ether, or with the muriate of ammonia and chloric ether. When vascular action presents diminished tone, the sulphate of quinine may be exhibited in the compound infusion of roses; or in the form of pill with camphor. Where the pulse is weak and quick, the evacuations offensive, and the disposition of the gangrene to extend very evident, the decoction of bark should be combined with the chlorate of potash, and compound tincture of bark; and if anxiety, pain, or irritability be present, the tincture of opium or the muriate of morphia may be added. The great frequency of pulse, and loaded state of the tongue, generally observed in hospital gangrene, even indicate the propriety of having recourse to these and similar remedies, or to wine, in some cases. Regard should also be paid to the previous habits of the patient; and persons addicted to spirituous liquors may be allowed them, but in duly prescribed quantities. If the stomach become irritable, the treatment I have advised above (§ 60.) may be employed, or spiced wine may be given; or soda water, spruce or ginger beer, or Seltzer water, may severally be made vehicles of tonic, stimulant, cardiac, or aromatic substances.

72. If diarrhoea appear, and threaten to exhaust the powers of the constitution, opium, or the compound tincture of camphor, should be given in full doses, with the tonic and antiseptic remedies already mentioned; or the chloride of lime may be used internally with tonics and aromatics, or with camphor, and the warm spices, or administered in mucilaginous and emollient enemata. — If delirium supervene, exhaustion of nervous power, with or without deterioration of the circulating fluids, may be inferred to exist; and camphor with opium, or henbane, the decoction of bark, with the alkaline subcarbonates and tincture of serpentaria, wine, and the other remedies recommended for *Putro-adyamic Fever*, and the low forms of *DELIRIUM* (see these articles), should be prescribed with a decision commensurate with the urgency of the case. Camphor, in order to be beneficial in hospital gangrene, ought to be taken either in frequent, or in large doses. If vascular action be much excited, it will be advantageously conjoined with the nitrate of potash, or nitrate of soda, or the alkaline subcarbonates, or other saline refrigerants. If vascular action be weak or impaired, and vital power manifestly reduced, it should be combined with the preparations of cinchona, or of serpentaria, or with the chlorides and aromatics. Cascarilla, cinchona, or arnica may be severally employed, in similar forms of combination, appropriately to the circumstances of the case.

73. In this form of gangrene especially, prophylactic measures founded upon a knowledge of the causes specified above (§ 38.) should be strictly enforced; and, as soon as the disease manifests itself, the patient should be removed into a well ventilated and dry apartment, and the

mind encouraged by cheering prospects, and by the confidence of the physician in the extent of his resources. The local treatment ought to proceed, as will hereafter be noticed, conjointly with the above constitutional means of cure.

74. *d.* When gangrene follows the bites of serpents, the viper, or other reptiles, the constitutional symptoms will then be characterised by depression of vital action and power so extreme as to threaten immediate dissolution, and to require the exhibition of ammonia, camphor, capsicum, and other energetic stimulants in large and frequent doses. In cases of this description, recourse should be had to local means (§ 78.) immediately upon the receipt of injury.

75. *ii. Local Treatment.* — *a.* Topical measures ought to be directed with the following intentions; namely — 1st. To restore the tone of the extreme vessels in, or surrounding, the gangrened or sphacelated part; — 2d. To procure the separation of this part as soon as it passes into sphacelation; — and, 3d. To prevent the contamination of the circulation and surrounding tissues by the morbid matter proceeding from its decomposition. Substances calculated to accomplish either of these ends, will generally also attain the others. Their application should, however, not be delayed either until the gangrened part pass into sphacelation, or after this result has taken place, but should be brought in aid of constitutional treatment. Before the discovery of the chlorides, and kreosote, numerous substances were recommended to arrest the progress of gangrene, and to fulfil the intentions just stated. In cases of internal gangrene, measures of this description can but rarely be employed. In gangrene of the lungs, however, the inhalation of the fumes of kreosote, or of the chlorides, or dilute chlorine, has proved of more or less service. A judicious use of these in external sphacelus is frequently productive of decided benefit, as they fulfil all the above indications. Next to them in efficacy, are the turpentine, and the balsams, especially the spirits of turpentine, and the Peruvian bal-am. When there are much pain and irritability of the part, opium may be added to the local applications. Many other substances have been recommended to be used topically in gangrene, but I must refer to the well-known work of Mr. S. COOPER for a sufficiently detailed account of them. A glance at the opinions of surgical writers on gangrene will readily show that each has been sufficiently disposed to enhance his own favourite application by depreciating those recommended by others, so that the inexperienced practitioner is bewildered amidst contradictory evidence on the subject. The substances already mentioned, especially LAMARCAQUE's fluid, strong solutions of the chlorides, or of kreosote, or of pyroligneous acid conjoined with kreosote, and spirits of turpentine, with or without this latter, are the most generally applicable. They may be used in the form of wash or lotion, or on the surface of any of the several kinds of poultices commonly prescribed.

76. *b.* In gangrene from animal poisons, the local treatment need not differ materially from that now advised. In this variety, as well as in others, different means have been recommended. The application of arsenic has been directed for phagedenic gangrene, by FABRICIUS HILDANUS and ZINKE; the actual cautery, by CÆLUS,

MICHEL, LOEFLER, MURRAY, and others; powdered bark, with turpentine, by KNACKSIEDT; these latter substances conjoined with the muriate of ammonia, by DUSSASSOY; the subcarbonate of iron, by BRANDIS; charcoal, by MARCUS, BEDDOES, and BORNEMANN; the pyroligneous acid by SIMONS; and a strong mixture of camphor in thick mucilage, spread over the part, by SCHNEIDER. In this form of gangrene, more, perhaps, than in any other, it is important completely to exclude the external air from the diseased surface, at the same time that the intentions with which external remedies are employed, should be strictly observed. Therefore, whilst the morbid secretions of the part should be prevented from accumulating, or be corrected by the antiseptics already mentioned, the access of air ought to be excluded by means best calculated to fulfil this end, and to be also the vehicles of antiseptic and stimulating remedies. A thick mucilage may, perhaps, be as advantageously used in this way as any other substance. But this intention is important not only in a curative, but also in a prophylactic, point of view. It is observed by nature in all external sores presenting a disposition to heal. When an eschar can be formed by any application, the end here kept in view may be accomplished by it. Indeed, the substances frequently resorted to in the present day, particularly the nitrate of silver, the actual cautery, and the stronger acids, as the nitric or muriatic, are beneficial by their operation in this manner, as much as by the stimulus they impart to the diseased surface.

77. *c.* The hemorrhage that often takes place upon the separation of the sloughs in phagedenic or hospital gangrene, may be arrested either by the means just mentioned, or by the application of the spirits of turpentine containing kreosote, or of strong pyroligneous acid with the superacetate of lead, or of a concentrated solution of the chloride of lime, or of any of the strong metallic salts.

78. *d.* In cases of the bites of poisonous reptiles, or even of the inoculation of virulent or morbid matter, the application of cupping glasses, or of other instruments by which the air may be exhausted over the seat of injury, was recommended by CÆLUS, and in modern times by SIR DAVID BARRY. The ancients, especially the Egyptians, resorted to suction for the removal of these and other poisons, when introduced by bites or wounds; and the practice is general even in the present day, in uncivilised countries; the fact having been well known to them, that the individual administering this sort of aid, will not himself be injured, if no abrasion exist on his tongue or lips. The common procedure in these countries, is immediately to place a ligature above the part where the poison has been inserted, when this can possibly be done, and next to have recourse to suction for its removal. I have seen this practice resorted to on two or three occasions, with success. When, however, it has been too long delayed, or cannot be adopted, ammonia, spirits of turpentine, and various stimulating substances may be applied to the part, as advised in the article POISONS. If gangrene have taken place, the local remedies noticed above, are the most appropriate.

79. *iii.* The Diet and Regimen in gangrene must necessarily be regulated according to the peculiarities of the case; but, in general, a mild, spare, and

digestible diet only should be prescribed. If the patient enjoy not a pure and dry air, he should, if possible be removed to a situation possessing this advantage. His mind should be encouraged, and his confidence insured, by the attention of his attendants, and the bearing of his physician.

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GASTRODYNEA. See article STOMACH — Altered Sensibility of.

GASTRO-ENTERIC DISEASE. — **SYN.** Gastro-enteritis. Gastro-entérite. Broussais.

CLASSIF. — GENERAL PATHOLOGY.

1. The diseases of the stomach and intestines are treated of in separate articles. But not infrequently both the stomach and intestines are more or less affected at the same time by inflammatory irritation or action, either primarily, or consecutively of other diseases, although not in the same manner, or in the same degree. — Inflammatory disorder coexisting in the stomach and intestines, although not so common, as M. Broussais has contended, is certainly very frequently observed, especially in connection with other complaints. Even when appearing as the consecutive ailment, its importance is often so great as to require attention to be directed chiefly to it in forming

the intentions, as well as in selecting the means, of cure.

2. Of the modern writers on Medicine, none has entertained juster views on the subject of gastro-enteric disorder, than Dr. W. STOKES, who has remarked that the pathology of the digestive canal has been but imperfectly understood in these countries, and that consequently a mode of practice productive of injury to human life has been too generally adopted. Several causes have conduced to this:—1st. The importance that has been long attached to disorders of the liver;—2d. The empirical or routine practice, introduced by the writings of HAMILTON and ABERNETHY;—and, 3d. The distrust with which the doctrines of BROUSSAIS have been viewed, owing to the unwarranted generalisations of which they in a great measure consist. If the school of BROUSSAIS have thus gone too far in attributing importance to gastro-enteric disorder, the writers and practitioners in this country have erred as remarkably, in overlooking it almost entirely. When we consider the connections of the digestive mucous surface, with the rest of the organisation, by means of that system of nerves which chiefly supplies it, and the important functions which this surface performs, we may infer that irritations, or inflammatory excitement, commencing in this quarter, will often be reflected on di-tant, but related organs. In childhood, and in early life, whilst the susceptibility of the system is at its maximum, the disorders consequent upon gastro-enteric irritation are diversified, of frequent occurrence, and often serious; and at later epochs of existence, although they may not be so obvious, nor so common, yet they are occasionally attended by danger. It becomes, therefore, a matter of extreme importance in medical practice, to trace the connection, the priority, and the procession, of morbid action in those parts of the system which are most intimately related to the digestive canal. The practitioner will find, on numerous occasions, disorder of this part associated with that of the cerebro-spinal nervous system, of the respiratory organs, of the heart, of the liver, or of the skin; and, although the affection of the digestive canal will sometimes be consequent upon, or coëtaneous with, either of these related disorders, yet a different order of succession will be much more frequently observed.

3. 1. *Connection of Gastro-enteric Irritation or Inflammation, with Affections of the Cerebro-spinal Axis.*—Affections of the brain and spinal cord are often complicated with disorder of the digestive canal. In many cases, the latter is merely functional, and depends entirely upon the intensity and extent of the former; but much more frequently, the affection of the brain is induced by irritation of the gastro-enteric surface. In children, this latter occurrence is remarkably common; and even in adults, a slight degree of disorder of the stomach is often followed by headach, somnolency, and incapability of mental exertion. The occasional dependence of epilepsy in adults, and of convulsions in children, upon morbid action in the digestive canal, is fully shown in the articles upon these diseases. Inflammation of the membranes, or of the substance of the brain, and acute hydrocephalus, sometimes also supervene upon gastro-intestinal irritation; and, in the course of their development, render obscure,

or entirely mask, the primary ailment; for, as LALLEMAND has remarked, as soon as the cerebral affection mounts to such a pitch, as even partially to ob-scure sensibility, the existence of disorder in the digestive canal is ascertained with great difficulty. I believe that the majority of cases of the affection, recently denominated spinal irritation, are caused by gastro-enteric disorder; chronic irritation in this latter situation being propagated to the spinal cord through the medium of the ganglial nerves communicating with the roots of the spinal nerves. It is of great importance to keep these pathological states in recollection, and to ascertain as far as may be their priority; for when affections seated in the cerebro-spinal axis are consequent upon gastro-intestinal irritation, a treatment directed for the removal of the former without reference to the nature of the latter, may, especially if it be of an exciting nature, aggravate and perpetuate the mischief.

4. This principle has been carried to an extreme length by M. BROUSSAIS, who has prescribed the use of purgatives even in the more dangerous affections of the brain, from the mistaken idea that purgatives will necessarily increase the already existing irritation of the digestive canal, of which he supposes the cerebral disease to be almost always a consequence. This doctrine comprises two assumptions:—1st. That the affection of the brain necessarily depends upon pre-existent irritation of the digestive canal;—and, 2d. That the exhibition of purgatives will increase this irritation, and thereby aggravate the cerebral disease. As to the first of these, it may be answered, with perfect truth, that the procession of morbid action he contends for, is only occasional or contingent upon concurrent circumstances: and, as respects the second, the converse of the proposition is probably the more correct; for a judicious exhibition of purgatives will frequently remove irritation of the digestive canal, especially if it be caused by unwholesome ingesta, or morbid secretions, or fecal accumulations; and, even when it cannot be referred to either of these, but rather to the state of vascular action in the digestive surface, the augmented secretion procured by refrigerant or mild purgatives may promote its resolution, or diminish its intensity.

5. 11. *Connection of Gastro-intestinal Irritation with Disease of the Respiratory Organs.*—a. The association of gastro-enteric irritation with most of the complaints observed in the respiratory organs, is of greater frequency than is generally supposed. Diseases being so universally described by writers and teachers as species of unvarying form, and without sufficient reference to diversity of character and complication, their more important connections and associations with other maladies are completely neglected, and are unknown to the young practitioner until obtruded upon him in practice. The complication of *bronchitis, cutarrh,* and other affections of the respiratory organs with gastro-enteric irritation, has been noticed when treating of these disorders. With respect, therefore, to these, I have only now to remark, that I have seen both forms of disorder follow coëtaneously upon the exciting cause, and that the prior existence of the gastric disorder has often predisposed to the bronchial or pulmonary disease, a very slight exciting cause being suffi-

cient to produce the latter, when the former is present.

6. *b.* During a number of years, I had almost daily occasion, at the Infirmary for Children, to enter against the names of some of the patients, *gastro-cattarrhal fever*, or *gastro-bronchitic irritation* or *inflammation*, according to the features of the case, as the names of the affections for which they were admitted. In these, it was difficult, if not impossible, to determine which was the primary disorder; but it was always evident that the complication was attended by much danger, the more especially as it occurred chiefly in debilitated or delicate children, and extended to the bronchi of both lungs. In many instances, the affection of the mucous membrane appeared to be universal, and the progress to a fatal issue was very rapid. Gastro-enteric irritation, although it can scarcely be considered as a cause of *tubercular consumption*, unless when it has continued long, is a very frequent concomitant of the early, as well as of the advanced stages of this malady. I have often observed that, when the former has been aggravated by improper diet or treatment, the latter has also been exasperated. (See *TUBERCULAR CONSUMPTION*.)

7. *c.* Even the occurrence of *pneumonia* may be favoured by disorder of the digestive canal; and, in this case, the pneumonia may assume a nervous or low character, constituting the *Pneumonia nervosa* of the older writers. The association of disorder of the digestive mucous surface with affections of the respiratory organs, although more generally neglected than might have been expected from the state of science at the present day, has long attracted some attention, as evinced by the notices taken of it by the older and modern writers, by the names *Stomach-cough*, *Vermineous Cough*, and *Dyspeptic Phthisis*. In *hooping cough*, it is often difficult to decide whether the digestive or the respiratory mucous surface be the most affected: the vomiting in which paroxysms of cough terminate in various affections of the chest, is perhaps as much owing to attendant gastric irritation, as to the convulsive action of the respiratory organs. In all cases, therefore, in which we have reason to dread the origin or association of pulmonary, or cerebral disease, with gastro-intestinal irritation, inquiries ought to be made for the symptoms by which this latter is indicated. When pain, tenderness, or tension at the epigastrium, or in the abdomen, are present; and particularly if the pain be increased on pressure, or be attended by nausea, flatulency, or acrid eructations, or occasional vomiting, and an irregular state of the bowels, the existence of gastro-enteric inflammation should be inferred, and the treatment ought to be directed to its removal. The means of cure, also, required for the pulmonary complication should be so devised as not to increase, if they may not diminish, the gastric irritation. The diet of the patient ought to be prescribed with similar intentions. When pulmonary affections are thus complicated, the treatment of them by means of tartarised antimony is frequently injurious, particularly in children, as tending both to aggravate the gastric disorder, and the nervous depression often attendant upon them. Even when pneumonia is thus associated, the tartar emetic may be dispensed with; and, as Dr. W.

Stokes justly advises, the strength of the patient must be supported by a farinaceous food, jellies, and broths, even whilst local depletions, and external derivatives, are being employed. The connection of gastro-enteric irritation with tubercular consumption is one of the most important topics in practical medicine, and one which has been imperfectly understood, and, with a very few exceptions, overlooked, by writers in this country. As the subject, however, belongs especially to this disease, in its practical bearings, it is considered under that head.

8. 111. *Gastro-enteric Irritation* often induces severe disorder of the vascular system.—This, perhaps, is the most common occurrence met with in practice. The febrile disturbances consequent upon irritating ingesta are so frequent, and so generally admitted, as hardly to require notice. Amongst children, they are constantly appearing, and almost as constantly are removed by means appropriate to the cause of irritation. If this be indigestible substances, an emetic, or purgative, will be the most efficacious, and by no means the most unsafe, treatment that can be adopted, notwithstanding the horror entertained by Broussais and his followers of these medicines. In such cases, the disorder subsides on the removal of its cause; but when it is induced by the inordinate use of stimuli, or by other causes that have either ceased to act, or admit not of so ready a removal, it will be better to leave the case to nature, than prescribe this treatment. In these circumstances, *refrigerants*, *cooling diaphoretics*, and mild *sedatives* with *emollients*, are the most appropriate. The nitrate of potash, or the nitrate of soda, the alkaline subcarbonates, the muriate of ammonia in small doses, sulphate of potash, and ipecacuanha, are severally of use, particularly in mucilaginous or emollient vehicles; but the bowels should be kept freely open by mild, oleaginous, or refrigerant purgatives.

9. I have already insisted upon the fact, that purgatives or laxatives, when judiciously selected, will rather diminish than increase gastro-enteric irritation. Some doubts may exist as to the operation of calomel in this way; but an extensive and diversified experience of this substance, and the experiments performed with it by Mr. ANNESLEY, have convinced me that in full doses it diminishes irritation and inflammation in the stomach and small intestines, whilst it increases, or even excites, these morbid states in the large bowels, and depresses nervous power, or augments the general susceptibility and irritability of the frame, especially if frequently exhibited, or continued for a considerable time.

10. IV. *The Connection of Gastro-enteric Disorder with Fevers*, is sufficiently illustrated in the articles on these diseases. It has formed the basis of M. BROUSSAIS' pathology of fever. Little, therefore, need be added at this place respecting it. The fact, however, must be admitted, that gastro-enteric inflammation, in more or less manifest grades, is one of the most prominent and constant phenomena of the invasion of exanthematous fevers; and that a somewhat similar state of vascular injection, or irritation, exists at this period in the stomach, and upper portions of the intestinal canal, to that which subsequently appears on the cutaneous surface;

the former, however, subsiding as the latter becomes developed. This is satisfactorily proved by the character of the symptoms, more particularly by the nausea, vomiting, epigastric tenderness, redness of the fauces, and edges of the tongue, &c. A somewhat similar condition most probably exists in the early stages of typhus and other fevers; but it is in the advanced periods of these, that the gastro-intestinal surface becomes most prominently affected. In exanthematous fevers also, particularly in delicate and cachectic subjects, or when the eruption has not been fully evolved, or has been delayed or suppressed, or has prematurely disappeared, the gastro-enteric disorder not infrequently is the most serious part of the disease, in respect both of the lesions in which it is prone rapidly to terminate, and of the cerebral affection, which it occasionally superinduces. It must not, however, be supposed from this statement, that I consider gastro-enteric irritation, or inflammation, to be the proximate cause or primary pathological condition of fevers. I merely contend that it is often one of the most prominent and important of the several lesions observed in their early stage, but is produced by changes still earlier in the chain of morbid causation.

11. There can be no doubt of the fact, insisted upon by Broussais and other French pathologists, that erythema, or inflammatory injection of the gastro-intestinal mucous surface, is a very general phenomenon in fevers, and that it may, and very often does, exist without pain, or even tenderness on pressure; but, however intense and prominent it may appear amid the various lesions characterising these maladies, it is certainly not the cause of the changes and symptoms attributed to it by these writers. Inflammatory irritation of this part, as severe as that observed in any form of fever, may exist without fever at all, and still more without the extreme prostration, which they believe it to occasion. The intestinal mucous surface suffers merely in common with all other tissues of the body in the progress of essential fever; but it is much more obnoxious to alterations than any other part, owing to the nature of its organisation, to its relations with other viscera, and to the numerous and diversified causes of irritation to which it is constantly exposed, particularly the morbid secretions, and the incongruous and exciting substances, continually passing over it.

12. *V. Connection of Gastro-enteric Irritation with Hepatic Disorder, &c.*—a. I have insisted, in the article DUODENUM, on the importance of attending to disorders of the upper portion of the intestinal canal, and of distinguishing between them and the affections of the biliary organs. Disorders of the stomach extending to the duodenum and jejunum, or even further, have been often treated in this country for diseases of the liver; and it must be admitted that the difficulty of forming a diagnosis between them is great. But the disorders of these portions of the alimentary canal, which are thus liable to be mistaken, are not so uniformly inflammatory as Dr. W. Stokes appears to believe, in his very acute observations on this subject; or, if they be, the inflammation is greatly modified by its connection with nervous asthenia, or other morbid states.—When, however, gastro-enteritis is really present,

two great evils result, as this able physician has remarked, from mistaking it for affections of the liver;—one, the neglect of the actual disease; the other, its exasperation by means supposed capable of removing the hepatic disorder. The consequence is, that the gastro-enteric irritation, being increased by the inappropriate treatment adopted, extends along the ducts, or by nervous and vascular connection, to the biliary apparatus; and thus the disease, which was in the first instance incorrectly supposed to exist, is actually superinduced by the means erroneously resorted to for its removal. M. Broussais has insisted upon inflammations of the liver being always consecutive of gastro-enteric inflammation. This, however, is one of the several generalisations at which he has arrived from insufficient data. But, until he wrote, the fact that irritation of the digestive canal, allowed long to exist, or to go on to inflammatory action, frequently induces chronic hepatitis, was entirely overlooked. There can be no doubt that prolonged and frequently repeated over-excitement of the digestive canal, by a too rich, stimulating, or full diet, or by spirituous or fermented liquors, is often followed by hepatic disease; but, as shown in the article LIVER, other causes, besides gastro-enteritis, are concerned in producing it. One of the most common circumstances in the production, or exasperation, of intestinal irritation, and of the ultimate supervention of chronic hepatitis, is the improper or too frequent use of acrid purgatives,—a practice to which I have traced a number of the cases of hepatic disorders which I have seen in a warm climate, and more recently in this country, particularly among persons who have returned from the East Indies, or from other places within the tropics.

13. The occurrence of disease of the liver, and even of abscess of it, consecutively upon chronic diarrhoea, and dysentery, has long attracted the attention of most practitioners in warm climates. In many of such cases, although there may have been reason to suppose, that the hepatic disorder preceded, or even caused, the intestinal affection, there can be no doubt that the persistence of this latter, or the exasperation of it, by a purgative treatment, has rendered the former more acute and manifest. Some difference of opinion exists as to the mode in which the gastro-enteric disorder is propagated to the biliary organs. Some suppose that the excitement is sympathetically extended to them, this extension being favoured by the associated functions of these different organs. Others believe that the inflammation has spread from the mucous surface of the duodenum to that of the biliary ducts. Instances have been adduced by ANDRAL, RIBES, BOUILLAUD, and REYNARD, which favour the inference that inflammation commences in the radicles of the mesenteric veins, and extends along the vena porta, and its ramifications in the liver. This, however, must be a circumstance only of occasional or rare occurrence. I have, however, long since supposed that the more acute attacks of inflammation of the substance of the liver, and the purulent collections frequently formed in it, in the course of chronic dysentery, have been superinduced in this manner.—Upon the whole, it may be inferred, that in complications of gastro-enteric with biliary disorder, either lesion may have been primary. But

that in this climate, especially, the gastro-enteric more frequently precedes than follows the hepatic affection. In warm climates, the converse of this probably obtains, although not to the extent very generally believed by many practitioners who have written on intertropical diseases.

14. *b.* That disease of the *mesenteric glands* is generally induced by the frequent recurrence or persistence of gastro-enteric irritation and inflammation, often connected, however, with various other elements of disorder, is sufficiently evident, and now very generally admitted. And yet I have seen, especially at an early period of my practice, this malady treated by purgatives, sometimes of a very acrid nature. The enlargement and obstruction of these glands, depending chiefly on the affection of the digestive mucous surface, can be remedied only by the previous removal of this affection, and by the prevention of its recurrence. When this end is obtained by local depletions; by refrigerants conjoined with the alkaline subcarbonates, ipecacuanha, and demulcents; and by suitable diet and regimen; the consecutive disease of the glands often gradually disappears.

15. VI. *The Connection of Gastro-enteric Inflammation with Diseases of the Skin*, is much more general than practitioners in this country suppose. It is chiefly owing to the irritation of the digestive mucous surface in various grades of severity, that the cutaneous affection resists so long the treatment prescribed for its removal. I have repeatedly seen cases of eczema, and of other obstinate diseases of the skin complicated with the slighter and more chronic grades of gastro-enteritis, the latter being even so prominent as to be indicated by epigastric pain and tenderness; yet arsenical, or other irritating medicines, were exhibited in no small quantities; and, although they were evidently exasperating both the internal and external affections, they were continued with a perfect belief of their applicability. Upon the adoption, in these cases, of general or local depletions, of refrigerant medicines, of warm and medicated baths, and of a light and appropriate diet, all disorder has soon after disappeared. The chief reasons of diseases of the skin proving so obstinate, are—1st. This form of complication;—2d. The inflammatory diathesis and vascular plethora characterising them;—3d. The neglect of these pathological associations, and the adoption in consequence of inappropriate means of cure;—4th. Inattention to diet and regimen, particularly as respects the use of animal food, and stimulating beverages and articles of diet;—and 5th. An insufficient observation of the states of assimilation and excretion, with the view of perfecting the ormer, and of promoting the latter.

16. VII. *Chronic Gastro-enteritis is often associated with Affections of the Genito-urinary Organs, and with Gout.*—We sometimes observe leucorrhœa and other uterine disorders connected with gastric irritation; the former most frequently being induced, or favoured in its occurrence, by the latter. Difficult or scanty menstruation is occasionally traced to the same cause. In these cases, the means calculated to relieve the disorder of the digestive mucous surface, are generally most efficacious for removing the sympathetic affection. A similar association of the disorders of the digestive and urinary passages is sometimes

also observed; but it is unnecessary to do more than to refer to it. How far gastro-enteric irritation may influence the states of urinary excretion, has never been so fully illustrated as is to be desired. What we know of the subject is derived from the researches of Dr. PROUR; and it is to be hoped that this scientific physician will proceed in his investigations into it. There can be no doubt that a state of chronic irritation, or of inflammatory erethism, of the digestive mucous surface, will so impede the functions of digestion and assimilation, as to cause a superabundance of materials in the blood, calculated to excite or to disorder the actions of the kidneys, and requiring to be eliminated from the circulation. When this disorder of the gastro-enteric surface is attended, as it not infrequently is, with a craving or morbidly excited appetite, food is taken in larger quantity than it can be digested; and much imperfectly formed chyle is carried into the blood, where it excites disorder of the liver, of the kidneys, and of the skin, in the course of the excretion of the unassimilated matters by these organs.—To this source may be traced, in many instances, not only the morbid conditions of the urine, and of the kidneys themselves, but also the production of an attack of *Gout*, in a regular or irregular form.

17. *The therapeutical indications, and even the means of cure*, for these various gastro-enteric complications, may be readily inferred from what has been stated above.—More precise information will, however, be obtained as to these topics, and as to the causes of the gastro-enteric disorder, by referring to the articles *GOUT*, *INDIGESTION*, *INTESTINES*, *STOMACH*, &c.

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GLANDERS.

CLASSIF.—III. CLASS, III. ORDER (Author, see *Classif.* in *Preface*).

1. DEFIN.—*Vascular injection, and chancrey sores of the membrane of the nose, frontal sinus, and parts adjoining, with a profuse offensive discharge, and pustular eruptions, or tubercular and gangrenous ulcers in various parts, preceded by constitutional disorder, attended by fever of a low or malignant character, and produced by contagion.*

2. Glanders until lately was considered exclu-

sively to belong to the horse, the ass, and the mule. Within these few years, several cases have occurred, showing that it may be communicated to man, in either the acute or chronic form. About twelve years ago, in the course of a discussion at the Medico-Chirurgical Society, I stated, that the fact of the disease having been thus communicated, had been proved by cases that had occurred in Germany. The cases to which I then alluded were published in *Rust's Magazine*, for 1821. Since then, cases have been observed in this country, and published by Mr. TRAVERS, Mr. BROWN, and Dr. ELLIOTSON. It is to this last gentleman, however, that we are most indebted for a full elucidation of the subject, by his able researches. The frequency of the occurrence of the disease in the human subject justifies the notice that will be taken of it in this work.

3. *Acute and chronic glanders* are contagious amongst the animals just mentioned; but from the facts adduced by Mr. COLEMAN, Dr. ASHBURNER, and Dr. ELLIOTSON, it evidently appears that the disease may be generated anew, when horses are shut up in a confined space for a long time, as on board transports. The characteristic symptoms of the disease in its acute form in the horse, are—intense inflammation of the pituitary membrane, attended by erosions which soon pass into chancre-like sores; swelling of the lips and nose; rapid extension of the ulceration, giving rise to a purulent and disagreeable discharge, which often passes to a purplish, or bloody, and horribly fetid sanies; subsequently, gangrene of the nasal membrane, with increased discharge, sometimes with slight hæmorrhage; swelling and pain of the sublingual glands; inflammation of the conjunctiva and nasal eyelid, quickly passing into a livid and swollen state, with an offensive sanious discharge; and fever of a putro-dynamic or malignant character. As the local changes extend to the adjoining parts, respiration becomes laborious, and the superficial vessels congested, the animal dying in a few days, or after a longer or shorter interval. If the disease is protracted, the symptoms sometimes relax, but the state of the pituitary membrane, and the character of the discharge, show that it has degenerated into a chronic form. Pustules may also appear in the progress of glanders, with gangrene of the external parts of the face, and tumours with swelling of the extremities, the disease being thus associated with farcy, which is a modification of it.

4. The *farcy glanders* generally appear in the form of small tumours about the legs, lips, face, neck, or other parts of the body: these tumours vary in size, and in the rapidity of their progress to ulceration. They sometimes create little inconvenience, particularly in a chronic state; but at other times, they are large, painful, numerous, and rapid in their course. They are at first hard; soon become soft, burst, and degenerate into foul ulcers, with abrupt edges, and of a pale glossy appearance. Lines of communication are generally observed between these tumours or ulcers, particularly when seated on the inside of the limbs: these lines are inflamed and enlarged absorbents.

5. I. DESCRIPTION OF GLANDERS IN THE HUMAN SUBJECT.—Dr. ELLIOTSON remarks that glanders may appear in the human subject in different forms.—1st. In that of *simple acute glanders*;

the disease attacking the nasal cavities and adjoining parts. 2d. In that of *acute farcy glanders*; the malady appearing in various parts, in the form of small tumours, giving rise to foul ulcers, suppuration, &c. 3d. These varieties may exist separately, or they may be both produced at the same time, or the one may precede the other. 4th. Each of them may also occur in a *chronic form*, and, in this form, also, may exist separately, or be conjoined. That the acute true glanders, and the farcy glanders, are the same disease, is proved by the fact, that the matter deposited in the tumours characterising the latter, or that coming from the nostrils in the former, gives rise to either of these varieties, or to them both conjoined; or, in other words, that simple acute glanders may proceed from the matter of farcy, or from its own discharge, and that farcy glanders may arise from the discharge from the nostrils in simple acute glanders.

6. i. *Simple Acute Glanders* appears to commence with rigors, headach, irritability of stomach, depression of spirits, prostration of strength, stiffness and severe constant pain of the joints, aggravated on motion, and great thirst. The patient, moreover, complains of much heat about the nasal organ and windpipe, accompanied with a copious viscid discharge. The nose and surrounding parts become swollen, hot, excoriated, and of a bright red or livid colour; one or both eyes are inflamed, or completely closed; a profuse tenacious mucus, at first of a deep yellow, but afterwards of a bloody or dark sanious appearance, exudes from one or both nostrils, sometimes also from the eyes; and several hard phlyzaceous pustules appear on the nose and adjacent parts, and on the neck, trunk, arms, thighs, and legs. The temperature of the skin is increased; the pulse is remarkably frequent, soft and weak, or undulating; the respiration, rapid, weak, and shallow; the tongue dry, rough, and brownish red; thirst is unquenchable; the stools are watery, or slimy and offensive; the voice is weak, and the mind incoherent or wandering. Copious offensive sweats, a livid or gangrened state of the nose or of adjoining parts, delirium, tremors, and restlessness, are also observed; followed by sinking of all the vital powers, disappearance of the pulse, and death within a very few days; the fœtor from the discharges, and from the whole body, towards the close of the disease, being insupportable.

7. *Upon inspection post-mortem*, the morbid appearances, especially those which are external, are greater on one side of the body than on the other. The lungs are engorged with dark fluid blood; the bronchi are livid, congested, and partially filled with a dark frothy mucus; the nostrils and frontal sinuses contain a glutinous matter, of a brownish colour, and the lining membrane is studded with ulcerated white tubercles or granules; irregular ulcers, or white circular chancres, sometimes also exist in the upper parts of the air-passages; purulent deposits are occasionally found in some of the internal viscera; and the mucous surface of the digestive canal is softened and discoloured at various points. White tubercular formations, resembling those found in the membrane of the nose, sometimes also exist in the mucous membrane of the large bowels.

8. ii. *Acute Farcy Glanders* seems to commence

with severe pain in the joints and limbs, and with the other symptoms attending the invasion of the preceding variety. Small tumours arise in different parts of the body, but are more numerous on one side than on the other, and have a glossy red appearance, which soon changes to a dark brown. They also affect the head, or even the face, and chiefly on one side. They are painful, soon crack on the surface, and exude a thin acrid sanies: they vary in size, and are generally accompanied by phlyzaceous pustules in different parts of the body. Perspiration is free, copious, and foetid; and the stools are watery, offensive, or otherwise morbid. The fauces are injected, and of a purplish hue; thirst is great; the tongue foul, loaded, and dark-coloured; the pulse quick, and easily compressed, afterwards small, and scarcely perceptible; and the other symptoms attending a fatal termination soon afterwards appear, as in the preceding form. On inspection after death, the tumours are found deeply seated. On removing the gangrenous integument covering them, a layer of brown glutinous matter is seen covering small white tubercles, having the same appearance as those found in the frontal sinuses, and nasal cavities, in acute simple glanders. These tubercles on the forehead or scalp are generally connected with the pericranium; but, on the limbs, with the fasciæ. — In some cases, on dividing the larger livid or gangrenous tumours, down to the bone, the muscles appear decomposed, are of a dark colour, exhale a peculiar foetid odour, and contain specks of purulent matter, as it were infiltrated through their substance. Underneath these muscles, clusters of circular grey tubercles are also found, firmly attached to the periosteum, and resembling those that are more superficial, as in the pericranium; &c. The muscles generally, even those remote from the tumours, are blanched, flabby, or softened, and the cellular tissue is infiltrated with a yellowish serum. The Schneiderian membrane, frontal sinuses, and parts adjoining, are sometimes thickened, or studded with white tubercles. The blood is dark, fluid, and decomposed; and the heart flabby and pale.

9. When *acute farcy* is conjoined with *acute glanders*, the affection of the nares and respiratory organs, the phlyzaceous pustules around the nose and mouth, and the consequent foetid, sanious discharge, and disorganisation, are associated with the foregoing phenomena; but the constitutional symptoms are not thereby otherwise changed, than in being aggravated, or rendered more malignant, or more rapid in their progress to dissolution. — In such cases, the morbid appearances of the nares, fauces, and respiratory surfaces attending the acute glanders, are superadded to those characterising acute farcy.

10. iii. *The Chronic Forms of Glanders.* — Simple chronic glanders is confined chiefly to one nostril, and is characterised by a glutinous and very offensive discharge, the fœtor being peculiar, and remarkably disagreeable. There are itching, with a constant desire to blow the nose, and a sensation of stuffiness. In the slightest state of the disease, these may be the principal symptoms; but, in an advanced stage, or in severer cases, there are pain between the eyes and down the nose, with suffusion of the eyes, and ulceration of the Schneiderian membrane; the discharge

being copious, puriform, or sanious. These symptoms are usually preceded by shiverings, giddiness, and by weakness and pains of the limbs; and are followed by more or less constitutional disturbance. As the disease proceeds, purulent collections form in different parts. There are, moreover, loss of appetite, nausea, vomiting, or pains of the head, occasionally wanderings of the mind, pains in the back and limbs, thick, discoloured, or foetid urine, and slimy, or otherwise morbid evacuations. From this state, the patient may slowly recover, after an indefinite period, or may sink gradually, from prostration of all the vital powers, with appearances of contamination of the circulating and secreted fluids.

11. *Chronic farcy glanders* are generally preceded and accompanied by chills or rigors, and aching pains through the body and limbs, resembling rheumatism. Tumours gradually form about the face, trunk, and limbs; these break and give rise to an unhealthy discharge; and are attended or followed by disease of the absorbents and glands, or by purulent collections in the joints, or in various parts of the body. The disease may commence in this manner, and thus terminate; or it may pass into the state of chronic glanders; or, in other words, the affection of the respiratory passages characterising simple glanders may be superadded; or, it may commence in this latter form, and be followed by the symptoms more especially marking the chronic form of farcy. In either case, the matter produces, as shown by the experiments of Mr. COLEMAN and others, acute glanders or farcy indifferently.

12. iv. *The Nature of this Disease* may be inferred from the history here given of it. It is evidently the result of a specific morbid matter, contaminating the surfaces and parts to which it is applied, affecting the organic functions, and giving rise to the changes characteristic of it. The state of the blood has not been sufficiently attended to in the history of the cases which have been put upon record. In several of those that occurred in Germany, the blood taken at an early period of the disease, appeared to be cupped or buffed; but it afterwards seemed deficient as to crasis, or partially dissolved, and very dark. In the variety of farcy, the absorbents, as well as the glands, appear to be much affected, probably owing to the passage of morbid matter along them; but there is much yet to learn as to the history of the disease, and the lesions which it occasions, and still more, as to its treatment.

13. v. *The Prognosis* of the acute varieties of glanders is extremely unfavourable; all the cases observed in the human subject having terminated fatally. The chronic states of the malady seem not much less dangerous. Two or three, however, of these which have been recorded, appear to have recovered. In one of those mentioned by Mr. TRAVERS, the patient was cured by means, one of the principal effects of which was to produce frequent vomiting. Dr. ELLIOTSON remarks, in his last paper on this disease, that its occurrence in the human subject is by no means of extreme rarity; and that, since the publication of his former paper, upwards of a dozen cases had been mentioned to him by medical men.

14. II. *TREATMENT.* — Our knowledge of the treatment of this malady has not been much advanced by the experience we have hitherto had

of it in the human subject. The prophylactic means are, however, made sufficiently evident by the recognition of its cause. There can be no doubt that it is communicated to man only by contact of the morbid matter proceeding from another person or animal suffering from it; and it would appear that the infection is most certainly produced by this matter being brought in contact with an abraded or punctured surface. Whether or not it is capable of producing the disease by being applied to the unabraded mucous surface, or by merely contaminating the air breathed by the unaffected, is certainly not proved as respects the human subject, although there are a few facts which seem to favour the affirmative conclusion. As regards, however, the horse and ass, there can be no doubt of the frequency of this mode of infection; and, indeed, of the possibility of the disease being generated *de novo*, when circumstances such as those already alluded to (§ 3.) contaminate the atmosphere, in which a large number of those animals are confined.

15. The method of cure is not so evident as the means of prevention. It may, nevertheless, be directed with the following intentions:—1st. To arrest the progress, or change the character, of the local affection;—2d. To moderate or modify the constitutional disturbance accompanying it;—and, 3d. To counteract the contamination of the fluids and soft solids taking place in its progress, and to support the powers of life. These indications require means for their fulfilment, possessed of energy proportionate to the violence of the disease; and whilst the local symptoms are attacked, the constitutional powers should be assisted in opposing their extension. With these views, the more volatile stimulating antiseptics, or warm aqueous vapour conveying their fumes, may be inhaled, or diffused in the patient's apartment. Solutions of the chlorides may be sprinkled around; or pyroligneous acid, with kreosote and camphor, or spirits of turpentine, may be scattered over the bedclothes, or put into an inhaler with warm water, and the fumes inspired. Any of the terebinthines may be similarly used; and solutions of either of these, or of the chlorides, may be frequently injected, or employed as gargles. The chlorate of potash, or LABARRAQUE'S antiseptic solution, may also be tried internally; and stimulating diaphoretics prescribed, early in the disease. The vapour bath, with the fumes of camphor diffused in it; the warm bath, containing a sulphuret, or consisting of water in which aromatic or stimulating herbs are infused; the nitro-muriatic acid, or chlorine baths, &c.; are severally deserving of trial. Terebinthinate embrocations, as warm as they can be endured, may also be applied externally; or turpentine may be given internally, in small and often-repeated doses, with aromatics, &c. The various means detailed in the article FEVER (§ 556. *et seq.*), with reference to the treatment of the typhoid varieties, may likewise be resorted to.

16. Dr. ELLIOTSON mentions (*Med. Gazette*, vol. vii. p. 655.) that the veterinary surgeon of the 13th light dragoons treated this disease in the horse by putting a quantity of scalded bran, mixed with Venice turpentine, into a horse-hair bag, and tying it over the horse's head; the whole body of the animal being wrapped at the same time in a large blanket wrung out of boil-

ing water, and covered with several horse-cloths. This treatment procured a profuse sweat, and a free discharge from the frontal sinuses and nostrils, and promoted the healing of the ulcerations. Dr. ELLIOTSON also states, in his last paper on this disease, that the sedulous injection of a solution of kreosote up the nostrils removed the whole of the symptoms, in a case of chronic glanders in the human subject, after a very few weeks.—Mr. STORRY (*Veterinarian*, vol. vii. p. 145.) adduces cases, in which fumigation with carbonic acid gas appeared beneficial in glanders occurring in the horse; but other means, as calomel, aloes, &c., were also employed.

17. In the chronic, as well as in the acute states of the malady, tonics or stimulants conjoined with purgatives, particularly cinchona, or the sulphate of quinine, capsicum, and camphor, with aloes, &c.; antiseptics, as the chlorides, hydrochloric acid, or chloric ether, kreosote, and pyroligneous acid; warm alterative diaphoretics, especially guaiacum, mezereon, senega, sassaparilla, variously combined; the terebinthines, balsams, &c., and fumigating or medicated warm baths; may severally be prescribed and varied, appropriately to the characters of the case. The excessive thirst always attending the disease will be most beneficially quenched by a liberal use of soda water, spruce or ginger beer, Seltzer water, &c., which may be rendered still more cooling by the addition of small quantities of nitre, or of the subcarbonates of the alkalis; or they may be made the vehicles of several internal medicines.

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GLOSSITES. See TONGUE—Inflammation of.

GOUT.—*SYN.* Αρθριτις (ἀπό του αρθρου); αρθριτικη νουσος, Hippocrates, Aretæus. Arthritis, Auct. var. Πόδαγρα, Hippoc. et Aret. Πόδαγρα (των ποδῶν ἄγρα, Lucian). Podagra, Auct. var. Πόδαγρια, Gr. Morbus Articularis, Pliny. Chiragra; Arthritis Podagra; Morbus Dominorum; Guita, Radulphus, Bartholin, &c. Febris Podagrica, Vogel. Podagra Arthritis, Parr. Arthrodynia podagrica, Swediaur. Causa podagrica, Young. Arthrosia podagra, Good. Goutte Arthrite, Fr. Gliedersucht, gichtschmerzen, Fugicht, Germ. Gotta, Ital. Gota, Span.

CLASSIF.—1. Class. Febrile Diseases; 2.

Order, Inflammations (Cullen). 3. *Class* of refreshing sleep, more rarely nightmare; general Sanguineous Diseases; 2. *Order, Inflammations (Good).* III. CLASS, IV. ORDER (Author, in Preface).

1. **DEFIN.** — *Constitutional disorder, giving rise to a specific form of inflammation; often favoured by original or hereditary constitution; appearing after puberty, chiefly in the male sex; returning after intervals; generally preceded by, or alternating with, disorder of the digestive or other internal organs; and characterised by affection of the first joint of the great toe, by nocturnal exacerbations and morning remissions, and by vascular plethora; various joints or parts becoming affected after repeated attacks, without passing into suppuration.*

2. 1. *Gout* is one of the diseases, the nature and treatment of which were best known to the ancients. — In modern times, however, the morbid relations and associations of the disease, and its various modifications have been more fully elucidated; and its treatment assigned accordingly with greater precision. But attempts at distinguishing its various manifestations, locally and constitutionally, and with relation to the numerous disorders arising in the gouty diathesis, have induced modern writers to make so many divisions of it, and to arrange its forms and states so differently, as to render its study somewhat perplexing to the inexperienced. This is one of the greatest objections that can be urged to the works of MUSGRAVE, GUILBERT, and some others. The arrangements adopted by some of the best writers on the disease are, however, very similar; and I will not materially depart from them. Those of CULLEN and GOOD nearly agree, and that of Sir C. SCUDAMORE and of Dr. MACKINTOSH is quite the same. Differing, therefore, but little from these writers, I shall consider — 1st, *Acute gout*; — 2dly, *Chronic gout*; — and, 3dly, *Irregular gout*. — The forms described by authors, under the appellations of *regular, acute, inflammatory, chronic, irregular, nervous, atonic, lurking atonic, primary asthenic, primary fixed, anomalous, wandering, internal, visceral, retrocedent, misplaced, latent, masked, emphysematous, flatulent, disguised, aberrant, &c.*, will be appropriately considered under one or other of the above heads.

3. i. **HISTORY OF ACUTE GOUT.** — A. *Of the Symptoms premonitory of the Paroxysm.* — Although the gouty paroxysm may attack suddenly a person apparently in good health, especially on the first occasion of its appearance, it is more frequently preceded by symptoms of disorder referrible chiefly to the digestive organs. I believe that, if the cases in which it is said to have appeared suddenly were investigated, it would be ascertained, that more or less disorder had existed for some days before the seizure, although not so as to have excited any concern in the mind of the patient. The most common symptoms of premonition are — flatulence, oppression after a meal, irregular appetite; heartburn, with acidity of stomach, sometimes with acid or acrid eructations; costiveness, irregularity, or, more rarely, an irritable state of the bowels; scanty, deep-coloured urine, becoming turbid or thick on cooling, or sometimes copious or pale urine; a sense of soreness, or occasionally of coldness, at the epigastric region; itching, or irritation of the skin; drowsiness, or frequent yawning, restless or un-

refreshing sleep, more rarely nightmare; general lassitude and depression of spirits. In some persons, the symptoms of gastro-intestinal irritation are still more manifest, the tongue being loaded, red at its point and edges, the epigastrium tender, and the stomach oppressed after a meal. In many cases, increase of copulency; scanty, thick urine; drowsiness, especially after eating, and a sense of general fulness and oppression, have preceded the paroxysm for a longer or shorter time, accompanied by several of the preceding symptoms. The appetite is frequently craving; and when indulged, is often followed by nausea, or vomiting of acrid matter, or by heartburn, flatulence, acrid eructations, &c. The premonitory symptoms vary in different persons, and depend much upon idiosyncrasy. Dr. MACKINTOSH justly remarks, that persons subject to gout are warned of a fit by some sensation or symptom peculiar to themselves individually: one feeling heat, pain, and dryness of the eyes; another, heat, redness, and swelling of the nose; a third, an unusual craving for some particular kind of food, or some peculiar feeling at the stomach, &c. Palpitations or internal flutterings; severe cough, with mucous expectoration; irritability of the bladder, the urine being loaded with mucus; a discharge from the urethra, with scalding, or difficulty in passing the water; unusual lassitude, and inaptitude for mental exertion; peevishness, irritability of temper; depression of spirits, more rarely an unusual hilarity; and various other symptoms, severally precede the paroxysm in different cases.

4. With more or less of these indications of constitutional disorder, the patient often experiences chills or rigors, followed by heat, flushings, headach, and the sensations referrible to the part about to be chiefly affected. These sensations, however, may have already appeared; but they are now more evident, and are increased during the night. The patient complains of weakness, tenderness, aching, numbness, prickings, or shooting pains, with spasms or a tingling sensation, in the limb; or of stiffness and weakness of the joints. A dark hue of the skin; fulness of the veins; swellings of the feet after exercise; disappearance of an accustomed moisture from the soles, with remarkable dryness and heat; and frequent change of position of the legs and feet, especially in bed, with general restlessness; are amongst the more constant precursors of the fit. One or both feet, particularly the soles, and the balls of the great toes, become burning hot: sometimes, however, they are cold, and are kept warm with difficulty; frequently the chilliness and coldness of the extremities alternate with feverishness, flushings, flying pains, and vertigo. Some of these symptoms, particularly the twitchings or cramps in the limbs, are felt chiefly when about to fall asleep, and are attended or followed by restlessness or watchfulness. Local signs of premonition are most common in persons who have experienced previous attacks. Where concretions have formed, severe pricking pains, with increased tenderness, are generally present. In those of an inflammatory diathesis, or who are plethoric, exposure to cold, or other exciting causes, may induce internal disease, with all the characters of idiopathic inflammation, which may continue for a longer or shorter time, and suddenly subside, being quickly followed by a regular paroxysm of gout; such instances,

however, belong to a form of the disease hereafter to be noticed.

5. *B. History of the regular Gouty Paroxysm.*—*a.* The first fit of gout, although commonly preceded by more or less of the above symptoms, sometimes occurs while the patient is in apparent health; but, even in this case, there have been indications of an inflammatory diathesis, or of vascular plethora, with slight disorder of the digestive organs. Most frequently he is suddenly awakened about midnight, or at one, two, or three in the morning, with severe throbbing pain in the affected part—commonly the ball of the great toe of one foot, attended by heat, stiffness, and a sense of distension and weight. These sensations increase to burning, with an actual augmentation of the temperature of the part, and with occasional severe stounding, or darting, pains up the limb. Restlessness, watchfulness, and fever increase, or continue, till about six or seven in the morning; when a gentle perspiration breaks out, followed by abatement of the symptoms, and some sleep in the slighter cases. The integuments of the part affected are swollen, slightly red, sometimes shining as if varnished; and the veins proceeding from it are remarkably full. In severe cases, but slight remission of the symptoms occurs for two or three days. More commonly, however, the symptoms abate in the day, but return, often with increased violence, at night, or shortly before midnight, and last till about five or six in the morning; the integuments have now become of a vivid or scarlet red, and admit of slight pitting on pressure. The pain is shooting, throbbing, intense, and gnawing, with an unpleasant sense of heat, burning, or weight. The least compression or touch of the joints cannot be endured.

6. *b. The constitutional symptoms of the paroxysm* vary with the severity of the attack, and the previous health of the patient. Fever is generally present, and commences as stated above. It is attended by restlessness, thirst, loss of appetite, oppression at the præcordia, flatulent distension of the stomach, with abdominal pain, costive or irregular bowels, morbid evacuations, and scanty high-coloured urine, depositing a pink or brick-dust sediment after standing, and sometimes containing mucus. The pulse varies, but is generally full or hard, and quicker than natural. Pain, heat, and tenderness of the epigastrium, with spasmodic sensations referable to the stomach, are frequently complained of, and are attended by sour eructations, or vomiting of acid or acid matters, sometimes mixed with bile, and causing unpleasant irritation of the pharynx and fauces. The tongue is furred or loaded, the papillæ erect, and the edges and point red. The stools are offensive, mixed with mucus, sometimes pale or clayey, but more frequently foul, blackish, or of an olive green. The symptoms altogether evince more or less irritation of the gastro-intestinal mucous surface, with obstruction or vitiation of the biliary and intestinal secretions. In old cases, and in persons far advanced in life, the attendant fever is much less inflammatory, and sometimes partakes more or less of the nervous character. In most instances, the nervous system evinces disorder by irritability of temper, increased sensibility, restlessness, and darting pains in the course of the nerves, very generally attended by violent cramps, or spasmodic contraction of the muscles

of the affected limb, and sometimes followed by the sudden transition of the disease from one limb to the other. Almost any change of posture produces this spasmodic action, and the severe pain attending it. Sir C. SCUDAMORE states, that of 120 cases, cramps occurred in 90, with more or less severity, either upon the accession of the paroxysm, or during its height, or at its close, or even during all these periods.

7. *c.* A first attack may continue from two or three days to ten or twelve. The oedema remains a short time after the inflammation, which disappears with desquamation of the cuticle of the part, and much itching. Sometimes the disease appears in the other foot, giving rise to the same succession of disorder, often with greater severity and prolonged duration. Sir C. SCUDAMORE thinks that the first attack is more frequently mild in men than in women; and states, that of 198 cases, the great toe of one foot only was affected in 130; the great toe of both feet in ten; the great toe and instep in three; the instep of one foot in five; the instep of both feet in three; one ankle in ten; both ankles in one; the ankle and instep of one foot in four; the right knee and left hand in one; the back of one hand in two; and the wrist in one; various parts of the lower extremities, especially of the feet, being affected in the rest. He further remarks, that, in hereditary gout, the great toe is mostly the part first affected; and that the exceptions to this seat of a first attack, are chiefly met with in persons who have acquired the disease.

8. *d.* The frequency of the returns of the fit depends upon the constitutional tendency, the treatment, and the regimen, and mode of life of the patient. Although the disease generally returns to the part previously affected, the other foot seldom escapes. Each succeeding seizure is usually more severe and of longer duration than its antecedent, and the attendant constitutional affection more serious. Exceptions, however, to this may occur when the disease has been treated with judgment, and the patient has been careful of his health. The intervals also become shorter, and the parts affected more numerous; but the fits are most apt to recur early in the spring, or late in autumn, probably owing to the variability of the weather at these seasons; but they may occur at any season. The malady generally acquires strength with each returning fit, both as to the number of parts affected, and as to the duration and degree of suffering caused by it; the susceptibility to it increasing both locally and constitutionally, with the repetition of the attacks.

9. *e.* In some persons, the gout seizes only the feet; but, in more numerous instances, in its progress, several parts are attacked in the same paroxysm; the gouty inflammation affecting different places in succession, or at the same time, with equal or various degrees of severity. The feet; ankles, knees, and elbows are occasionally thus successively or simultaneously attacked; together with the ligaments, the bursæ mucosæ, sheaths of tendons or aponeuroses. In the older cases, even the shoulders and hips are sometimes affected. The disease often suddenly leaves one part, and as instantly appears in another; but it occasionally commences in one situation before it departs altogether from the other. This rapid transfer of the morbid action

from one part to another, either of the same or of a different limb, is one of the most characteristic phenomena of gout. When it thus passes to the opposite limb or extremity, some indications of the disease have often existed previously in that part. In a few instances, the chief suffering of the patient is in the day; in others, both day and night are passed in equal pain: but in most cases, particularly in the more recent attacks, the night is the period of greatest distress.—The redness and oedematous swelling are most remarkable in the foot, hand, and elbow. In the ankle, knee, wrist, &c., there is little redness, excepting in small patches, and the swelling is caused by effusion into the sheaths of tendons, and into the bursæ; the latter often being greatly distended, painful, and exquisitely tender. In the more severe cases, the veins of the limb are large and full, and unusually numerous near the affected part. The pain in gout is peculiar—is severe, burning, throbbing, shooting or stounding, and otherwise modified in different cases, as stabbing, cutting, boring, or gnawing.

10. C. The *Sequels of Acute Gout* respect—1st. The effects of the disease in aggravating previous derangement, or inducing disorder of internal organs; and, 2d. The alterations produced by it in the part affected. —a. Severe attacks of gout impair vital power in the digestive, biliary, and nervous organs; or they may be said, with greater accuracy, to weaken still more the previously debilitated organic nervous influence. Hence occasionally result a numerous train of dyspeptic symptoms; hypochondriasis and torpid or otherwise deranged function of the liver; inaction of the æcum and colon, causing a sluggish state of the bowels and morbid evacuations; increased liability to apoplectic and paralytic seizures, or to cramps, wandering pains, &c. SYDENHAM supposed that gout disposed to the formation of urinary calculi; and numerous cases have been recorded in which either they or gravel in the urino alternated with the gouty paroxysm. This connection has received support from the observations of MORGAGNI, SCHURIG, BUCHNER, SHROEDER, MURINA, ILLM, and FORBES; but Sir C. SCUDAMORE states, that irritation of the urinary organs and gravel occur rather before and during the paroxysm, than in the interval; and that calculus of the bladder is a very infrequent complaint amongst gouty persons; of 231 of whom, five only were so afflicted. This, however, does not altogether disprove the connection; as renal calculi may have existed in some, if not in many of these. He, however, adds, that the urine of gouty persons deposits, without any exception, at some period or other, either gravel or the pink or brick-dust sediment. There can be no doubt that the gravel is formed either in the kidneys, or in the urinary bladder; and if this be granted, a strong argument will be thereby furnished in favour of the occasional supervention of calculi.

11. b. The most frequent consequence of acute gout, as respects the local affection, is the passage of it into the chronic form; but before this degeneration may have taken place, several lesions of the tissues composing the part affected may be produced by acute attacks. These are—weakness, stiffness, and lameness of the joint, with a snapping or grating sensation upon motion, owing to imperfect secretion of the synovial fluid. The

ligaments and muscular aponeurosis become thickened, stiff or inelastic, and tender. The secretion from the sheaths of the tendons is thickened or otherwise vitiated, causing a knotty and thickened feel upon examination, sometimes with contraction and rigidity. The bursæ mucosæ are enlarged, and either distended, or soft and yielding to the touch. The contents of the small bursæ are sometimes inspissated so as to form hard tumours; and the deep-seated textures of the joints become thickened and apparently consolidated. The veins of the feet and legs are often either enlarged or varicose; but these, as well as various other changes, as concretions, &c., are chiefly the result of the chronic disease.

12. ii. CHRONIC GOUT. —a. This state of the disease is characterised by the inflammation and pain being more slight, irregular, and wandering, than in the acute; by the faint redness of surface, the permanent distension and oedema of the part; by impaired power of motion; by its more continued duration, and association with disorder of the digestive organs; by the languid or oppressed circulation; and by general irritation of the nervous system. It is generally a consequence of one or more acute attacks, either when the paroxysm has not passed off with a regular crisis or evacuation, or when repeated seizures have so enfeebled the constitution as to render it incapable of manifesting sthenic action. It may, however, appear primarily, constituting the *Primary Chronic Gout* of J. P. FRANK. In this case, instead of severe paroxysms occurring at distant intervals, the seizures are much milder, but much more frequent, prolonged, and irregular. Primary chronic gout is more common among women than men—and in them, especially, seldom affects the great toe; sudden swelling, and pain, with but little of the appearance of the gouty inflammation, affecting chiefly the instep or ankle, or the wrist or hand. When chronic follows acute gout, the various parts which had been inflamed in the paroxysm of the latter, continue affected, either alternately or in conjunction; but the pains are more wandering, and have now and then a rheumatic or nervous character.

13. b. Whether primary or consecutive, *chronic gout* presents the following *local symptoms*.—A sense of alternate heat and coldness is felt in the affected part, and is much increased at night. There are often numbness and an uneasy sense of fulness and weight. The muscles and joints feel weak, and cramps of the lower limbs occur chiefly at night, when falling asleep. Startings and restlessness are generally also complained of. The surface of the part is either of a pale-reddish colour, or of the natural hue, or of a purplish tint, the discoloration being sometimes transient. The parts are tender; shooting pains pass along the nerves; motion is difficult and painful; and the energy of the limb very much impaired. The bursæ and the sheaths of tendons are more frequently affected in the chronic than in the acute gout, occasioning puffiness and distension. Oedema is generally present and permanent, attended by fulness of the veins. Even in the slightest cases, aching and a sense of heat are felt in the ankles after walking.

14. c. The *constitutional symptoms* are remarkably diversified by the temperament and habits of the patients, the situation and degree of the

local disease, and by the nature and extent of the internal associated disorder. Numerous dyspeptic symptoms and uneasy sensations referrible to the stomach,—as craving for food, nausea, oppression after a meal, flatulency, heartburn, a sense of coldness at the stomach, transient pains, or spasms of the muscles of the abdomen or chest; a costive or irregular state of the bowels, with morbid or offensive stools; a deficient or unhealthy biliary secretion; and hæmorrhoids, with evacuations of blood; are often present. Feverishness or irritation follow too full a diet, or stimulating food; and a sallow or slightly yellow cast of countenance, with uneasiness or pain in the hypochondria, and deficiency of bile, are not infrequent. The urine is various, being sometimes scanty, high-coloured, or thick, or occasionally abundant and dilute; it generally deposits a pink or lateritious sediment. Palpitations and flutterings of the heart are very common, particularly when there is much flatulence. Sleep is broken, disturbed by unpleasant dreams, and unrefreshing; the temper is irritable, and the mind hypochondriacal, imaginary or trifling ills occupying the attention. In some cases, a chronic dyspeptic cough, or an increased secretion of mucus in the trachea, is complained of. Many persons, especially females, are exquisitely sensitive, and have their ailments increased by vicissitudes of atmosphere, especially by cold and humidity. In prolonged or severe cases, the system often becomes cachectic; the limbs weak, stiff, and wasted; and the abdomen large. Although the patient's appetite may be natural, yet he is neither nourished nor strengthened by his food, which may even increase both the constitutional and local affection.

15. *d.* The *concomitants or consequences* of prolonged chronic gout are, thickening and consolidation of the tissues of the affected part. The veins of the limb often become varicose, and increase the aching and fulness of the part, or cause purplish blotches of the surface, and, although rarely, ulceration of the skin. — *Gouty concretions* occur only in a few cases, and arise from the effusion of a whitish fluid, the watery portion being absorbed. Mr. MOORE remarks, that this effusion occurs not only during the fits, but also in the intervals; that it is not enclosed in a cyst, but usually lies in the cellular membrane, in the bursæ mucosæ, or in the cavities of joints. In the sheaths of tendons, these concretions are generally hard or stony; in the bursæ, they are likewise hard; and in the cellular tissue, their consistence varies. They may also form between the cuticle and cutis; where they vary in consistence, or even occasion intractable deep ulcers, as in a case related by Mr. HERBERT BARKER. When they are situated within the capsular ligaments, the cartilage is absorbed, and one or more phalanges distorted. Sir C. SCUDAMORE mentions several such cases. When the concretions cause ulcerations, the chalk-like matter is constantly secreted in a fluid or semifluid state, and accumulates in the bottom of the ulcers.* The surrounding

surface is usually of a red colour, shining, and the seat of severe burning pain — symptoms occurring in paroxysms, with remissions or intervals of various duration. In such cases, erythema or erysipelas may be associated with the local affection. Although the concretions generally appear in the joints and surrounding tissues, they may occur in other situations, either simultaneously, or otherwise. MORGAGNI mentions their formation in the breast of a patient suffering from hereditary gout. In the case detailed by Mr. BARKER, there was a gouty concretion of the size of a horse-bean deposited on the left side of the nose. Dr. ELLIOTSON met with a case in which they formed in the ears. Their chemical constituents seem to be lithic acid combined with soda, potash, or ammonia, but mostly with soda, and with a little animal matter. They are of a light, or whitish grey colour; insoluble in cold, and partially soluble in boiling water.

16. *iii.* *IRREGULAR GOUT.* — Under this head may be arranged the various states of disorder, either occurring in the gouty diathesis, or connected with the appearance of the gouty paroxysm, or following its sudden cessation in an external part. In this extended acceptance of the term, *irregular gout* will comprise the brief consideration of those derangements to which the names *anomalous, imperfect, internal, visceral, misplaced, displaced, retrocedent, transferred, metastatic, wandering, flying, disguised, masked, &c.* have been applied. I shall, therefore, consider — 1st. Those specific or anomalous disorders appearing in the gouty diathesis, and followed by a complete or imperfect external gouty affection; — 2dly. The derangements consequent upon the sudden cessation of the gouty paroxysm; — and, 3dly. The various anomalous or disguised affections afflicting persons of the gouty diathesis, without being followed or attended by any manifestation of external disease. It has been urged by some modern authors, and even by the latest writer on gout, Dr. BARLOW, that several of the forms just alluded to are merely internal disorders occurring in gouty persons, and differing, in their nature and treatment, in no respect from those usually observed; or, in other words, that these internal affections possess no specific gouty character. This is true in one point of view only, but not in others; for it must be admitted that the gouty are even more liable to internal diseases than healthy persons, and that these diseases will often pursue the usual course in the former as well as in the latter. That the gouty are very liable to nervous and functional disorders, especially those implicating the digestive and excreting functions, and that those disorders often present nothing peculiar, are generally admitted; but that many of the affections which either precede or follow the external manifestation of gout, or that appear in the gouty diathesis, differ very materially from those observed in other persons, is shown by the following circumstances: — 1st. Gouty inflammations of the eye are very different in their visible characters, their seats, and their consequences, from common ophthalmia; and every one possessed of due powers of discrimination, will

* "An officer of temperate habits, who had undergone much active service, was, for some years before his death, *ætat.* 45, much affected with gout: many balls of chalk were removed from his hands, and he could write on the table with the point of his finger. Ulcers had also formed

on his feet, which usually discharged an ounce of fluid chalk in the 24 hours." (*Catal. of Prepar. &c. in the Museum of Fort Pitt, &c.* p. 167.)

admit that they require a different mode of treatment. 2dly. The knowledge we possess, however imperfect it may be, as to the changes and appearances consequent upon fatal internal disease in gouty persons, is conclusive of a material difference between them and those following more common maladies; and, 3dly. The *juvantia* and *lædētia* in the former are often very different from those in the latter.

17. *A. Specific or anomalous affections often precede the external manifestation in a complete or imperfect form of acute or chronic gout.* They may be either in every respect similar to other affections of the same seat, or very different and peculiar. In the former case, the external appearance of gout seems critical, and has been viewed as such by many writers; in the latter, it appears as the external manifestation of a constitutional disorder previously implicating the functions or sensibility of one or more internal organs. — In perusing the older writers, numerous instances present themselves of gout supervening upon, and appearing critical in, inflammatory and severe internal complaints. MORGAGNI considered himself cured of an ophthalmia that had resisted treatment, by an attack of gout. Dr. BAILLIE mentions a case of palpitation of the heart disappearing upon the occurrence of the gouty paroxysm; but these are not rare occurrences. Indeed, palpitations of the heart are frequently symptomatic of the disorder of the digestive organs ushering in the seizure. Affections of the urinary organs, erysipelas, asthma, and other diseases, have likewise been removed by a regular fit of gout. One of the most interesting illustrations of the succession and critical influence of gout upon dangerous internal disease, occurred to a medical gentleman whom I attended in 1824. He was seized in the evening with symptoms of complete congestive apoplexy, for which he was bled and purged, but without restoration of his consciousness. On the following morning, gout suddenly appeared for the first time, with great intensity in the ball of the great toe of the right foot, and instantly removed all the apoplectic symptoms, the mental functions being perfectly clear and undisturbed on my seeing him very shortly afterwards. When gout assumes a regular character, such antecedent affections appear merely as unusual precursors of the paroxysm, ushering in either the first seizure, or an attack in persons who had been previously affected by it.

18. *B. Retrocedent or displaced Gout — recedent, or transferred, or metastatic Gout — Podagra retrocedens — P. retragrada, CULLEN — P. complicata, GOOD. — a.* During the gouty paroxysm in either its acute or chronic form, it sometimes happens that an internal organ becomes suddenly and dangerously affected, the external disease being either much mitigated, or having entirely disappeared. It has been disputed whether the internal disorder arises from the suppression or subsidence of the external affection, or whether the latter disappears in consequence of the occurrence of the former. Either may take place, as evinced by the succession of morbid phenomena, in different cases: the development of disorder in an internal organ, deriving it from external parts in some instances; and the suppression of the external manifestation of a con-

stitutional disease, determining it to an internal predisposed viscus in others. When retrocession occurs in the height of an acute paroxysm, the superinduced malady is generally also acute, and rapid in its course; but when it takes place in the chronic form, it is often less severe and more prolonged. The internal affections, which thus arise, are generally caused by the patient's imprudence, by his habit of body and temperament, by previous disorder, or by injudicious treatment and management. The stomach is most liable to be affected, severe pain and spasm, with sickness, being complained of. The intestines may be also attacked, either alone or in conjunction with the stomach, with all the symptoms of acute inflammation; either form of disease often pursuing a violent or rapidly fatal course. Severe pain in the head, and symptoms of inflammation of the brain and its membranes, stupor, coma, apoplexy, epilepsy, or palsy, supervene in some cases, especially in those who have previously evinced a tendency to these maladies. In other instances, affections of the chest appear; particularly dyspnoea, sense of suffocation, oppression at the præcordia, with or without cough or expectoration. In some, pain or constriction in the region of the heart, violent palpitations, oppressed breathing, urgent anxiety, syncope, or leipthymia, &c. occur, indicating a serious affection of the heart or pericardium. In a case of this description recorded by Mr. BROWN, and which terminated fatally some months after the disappearance of gout, the pericardium was thickened, and containing six ounces of bloody serum; the heart was greatly enlarged, and its substance was pale, soft, flaccid and attenuated, its internal membrane being of a deep violet colour; honeycombed ulcers were also observed at the root, and in the arch of the aorta. Other diseases of an inflammatory, spasmodic, or nervous character, or of these mixed, may follow the disappearance of the external gouty affection, more particularly dysentery, hepatitis, peritonitis, and various affections of the urinary or uterine organs. Dr. CULLEN mentions strangury, catarrhus vesicæ, and hæmorrhoidal affections, amongst those not infrequently alternating with gout; and instances have occurred to myself, as well as to Sir C. SCUDAMORE, Mr. HOWSHIP, and many others, of the transference of the morbid action to the kidneys, causing suppression of urine, or inflammation with partial suppression; or to the neck of the bladder with severe spasm, or even to the prostate gland. Mr. HOWSHIP mentions, that when gout is transferred to the kidneys, the urine becomes albuminous, as well as scanty. Dr. HOME states, that a gentleman, who exposed himself to cold and wet, whilst affected by gout in the feet, was in a few hours afterwards affected by enteritis, which proved fatal in twelve hours; and Sir C. SCUDAMORE mentions, that Dr. PARRY met with two instances of extravasation in the brain in the same winter, after repelling gout from the extremities by immersing them in cold water.

19. *b.* The information we possess as to the lesions produced by the transference of the morbid action to an internal part, is extremely imperfect; many who have the opportunity, not giving themselves the trouble to inquire respecting them, or supposing that little or no alteration may be expected in such cases. Others, again, believe that

the changes consist chiefly of those produced by inflammatory action. Without disputing that the consecutive affection is frequently inflammatory, I have seen it, in several instances, possessed of a distinctly nervous and spasmodic character, or consisting chiefly of remarkable depression of power, with the abolition of the function of the organ principally affected, and most intense suffering. A medical friend, some years ago, whom I attended in the disease, took, contrary to my wish, and previously to removing biliary accumulations and morbid excretions, a large dose of colchicum; and was very shortly afterwards seized with violent pain in the stomach, a sense of sinking, and languid small pulse, the gout having instantly disappeared from the foot. I soon afterwards found him in the utmost agony, and prescribed large doses of camphor, with other diffusible stimuli, and mustard cataplasms to the feet. The gout as instantly returned to the extremities, and the affection of the stomach disappeared. A medical man, lately resident in Crawford Street, experienced, in 1830, an imperfect attack of gout in the feet. When I saw him, it had just forsaken this situation, and in twenty-four hours it successively had attacked the bowels, in the form of most violent colic, the diaphragm, and lungs, causing the most urgent dyspnoea; and lastly, the head, in a slight degree. The disease then appeared in one foot, and afterwards transferred itself to the other. In these cases, the phenomena of internal disorder were those of severe nervous affection, probably also connected with congestion, or irregular determination of blood; and the treatment founded on these views procured relief in them all.

20. Formerly, the internal affections thus connected with the disappearance of gout, were too exclusively viewed as nervous, and treated as such, notwithstanding the indications of inflammatory action sometimes attending them. More recently, and even at the present day, a very opposite opinion has been promulgated. Dr. GILCHRIST, of Edinburgh, supported this latter opinion, and was followed in it by Dr. BATEMAN and Dr. BARLOW. Fully admitting the inflammatory character of these consecutive affections in some cases, I must strenuously contend that it does not constitute the principal feature of them in others. In several instances, three of which occurred in medical men in this city, an inflammatory state could not be inferred either from the sensations of the patients, or from any symptom that I observed; and as the treatment founded upon the gouty and nervous characters of the disease was successful, there is no reason to infer that a latent inflammation had existed in these cases. That inflammatory and congestive affections of various internal viscera often occur, in such circumstances, cannot be disputed; but the practitioner should be prepared to meet also with very different and often anomalous disorders—to find some attended by the most intense suffering and distress; others by a feeling of sinking or dissolution; others by distressing anxiety, terror, and irritation; others by spasmodic action and morbid sensibility; and, lastly, others by constant pain, internal heat, distension, tenderness, and other indications of inflammatory action. In some, the pulse is weak, irregular, fluttering, small, or intermittent; in others, excited, fre-

quent, irritable, but regular; or full, strong, and energetic. I have even seen it all these in succession, in the same retrocedent affection, and within a few hours. Some cases, even where the same organ is implicated, are attended by constant pain, a sense of increased heat, or of burning, remarkable tenderness, and excited pulse; and others, by remarkable depression, great languor, a sense of coldness or of weight, or oppression, a weak and languid pulse, and a feeling of vital exhaustion and of impending dissolution. Of the pathological relations of these different morbid conditions, more particular notice will be taken hereafter (§ 40—42.).

21. *C. Disguised or lurking Gout*—*anomalus, imperfect, internal, visceral, nervous, masked, or misplaced Gout*—*Podagra atonica, CUTILEN*—*Podagra larvata*, GOOD.—The gouty diathesis may be generated in a constitution too weak to develop the local affection in the extremities. When this is the case, various disorders affecting internal organs, most frequently those of digestion and excretion, arise, and often assume anomalous or Protean forms, with functional or nervous characters, and even congestive or inflammatory states, as in retrocedent gout. In that variety, the internal disease is preceded by, and is rapidly consecutive of, the disappearance of an external gouty affection; but this variety is frequently unattended by any such affection, however slight or fugitive, although it may occur. It has been too generally inculcated, that the disorders appearing in the gouty diathesis have nothing peculiar in their character, or different from those observed in other circumstances. This subject has been already sufficiently adverted to, with reference to retrocedent gout; and the observations there made are equally applicable to those affections which appear in the lurking or disguised manner now being considered. When, in connection with the generation of the gouty diathesis, the constitutional powers have been greatly impaired, and the functions of excretion weakened, numerous internal disorders result, whether the patient may have experienced a fully formed fit of this disease or not. A fastidious or impaired appetite; a sense of distension and flatulence; acid or acrid eructations, or nausea or vomiting; spasmodic constriction, or most painful oppression at the epigastrium; costiveness and violent colic; mental depression, anxiety, or hypochondriasis; palpitations, or other irregularities of the heart's action; hemicrania, vertigo, and various affections referred to the head, or even palsy, epilepsy, or apoplexy; nervous excitement and irritability, with a sense of depression, and several other affections; sometimes present themselves, either with or without slight manifestations of gout in one or other of the external situations above enumerated. That those complaints are favoured by, and very often occur in, the gouty constitution, cannot be, and, indeed, is not, doubted. The question only is, whether these be of an inflammatory, or of a nervous, or of a mixed, or of a specific or peculiar character. That they are functional, chiefly, cannot be disputed; but that others of a more decidedly inflammatory or congestive kind may occur, as in cases of retrocedent gout, seems to be most consonant with the phenomena observed in different cases, and with the pathology of the disease, according to the view of it hereafter to be exhibited. Dr. HAYCARN

has recorded two most interesting instances of misplaced gout, causing arthritic carditis in the one case, and enteritis in the other; and, although an attack of gout had not been experienced for many years, moderate depletions, and sinapisms applied to the extremities, were followed by the external gouty disease.

22. It is not unusual to hear persons who are advanced in life, and who have ceased to have their usual attacks of gout, complain of various nervous or functional disorders of so remarkable and peculiar a kind, as to convince them that gout is affecting or wandering through the system without developing its usual effects. Sir C. SCUDAMORE very justly observes, that some gouty persons are affected with severe colic upon accidental exposure to wet and cold, or from acid or indigestible articles of diet; and that almost invariably these attacks are spasmodic and not inflammatory; hot brandy and water, or compound spirit of ammonia, giving relief. It should, however, be recollected, that the continuance of pain may cause congestion of, or inflammatory determination to, the affected part. The internal complaints occurring in the gouty diathesis are generally attended by sensations so distressing, and often so peculiar, as to excite suspicions of their nature in the mind of the patient, and to cause him to desire an attack of gout, however severe, in the extremities, believing that it will remove the internal and more dangerous sufferings. Sir C. SCUDAMORE defines these affections "to be disordered functions of internal organs in a gouty constitution, and thereby modified in their character;" and in this opinion he has been followed by Dr. BARLOW and others. Dr. CULLEN, and those who preceded him, distinguished these complaints by the term "misplaced gout;" and, as it will appear in the sequel, the difference between the ideas intended to be conveyed by these terms, is more apparent than real; for the one, in admitting that such complaints are modified by the gouty diathesis, concedes all that is contended for by those who distinguish them by applying to them, without circumlocution, a term indicating at once their most important features and relations.

23. II. DIAGNOSIS. — *A. Acute Gout* may be mistaken for *acute rheumatism*, which it may approach more or less near, when the latter affects the joints; or for common inflammation of these parts. — It seldom happens that more than one part is affected, and still more rarely that more than one is attacked at the same moment, in the first fit of gout. This character, however, cannot be extended to acute rheumatism. In the former, there is much more disorder of the digestive organs precursory of the attack, than in the latter, and the remission from pain and fever, during the day, is much more distinct. In *gout*, serous effusion into the cellular tissue is early in the fit, and to the extent of admitting of slight pitting on pressure; the veins are turgid in the vicinity of the affected part; the pain is pungent, severe, burning, stounding, lancinating, or peculiar; the surface is inflamed, deeply red, shining as if varnished, turgid, and exquisitely tender; the temperature of the part is very much increased; and the urinary secretion is remarkably disordered, generally depositing a quantity of the pink or lateritious sediment, consisting of the lithate of soda, the tinging substance being the

purpurate of soda. These symptoms are either absent or slightly marked in acute rheumatism.

24. The hereditary character of gout; the frequency of it in the plethoric, sanguine, and irritable constitutions, and at an advanced age; the sudden incursions of the fit; and the commencement of it in the small joints; further serve to distinguish it from rheumatism. Although gout may affect the knees, shoulders, elbows, &c., after repeated attacks, or in its chronic form, it rarely commences in these situations; whereas rheumatism generally begins in the shoulders and larger joints. — It is sometimes, however, observed that the patient, on recovering from the one disease, may be attacked by the other, upon exposure to its exciting causes; and a person, who early in life has lived frugally and laboriously, and been subject to attacks of rheumatism, has, at a more advanced age, lived fully and indolently, and been attacked by gout. In either case, the patient himself has no difficulty in distinguishing between them; and the experienced practitioner will have as little, however much he may be at a loss to convey his ideas respecting their diagnosis to others. It is not so much by any one mark, as by the concurrence of several circumstances, connected with the causes, the constitutional disturbance, antecedent and existing, and with the local characters, that a correct diagnosis can be formed. *Common inflammation of the joints* cannot be mistaken for acute gout, if the character of the pain, the state of constitutional disorder, and the urinary secretion, receive attention. The continued or unremitting state of the symptoms, and the course, progress, and termination of the disease, will also serve to distinguish them.

25. *B. Chronic Gout* may be distinguished from *chronic rheumatism* by several of the circumstances already adverted to. — The former is much more frequently preceded by the acute disease, and by disorder of the digestive and excreting functions, and is very much oftener attended by swelling, thickening, or nodosity of the affected parts, than the latter. However, cases not infrequently occur, in which gout, in its more chronic form, very nearly resembles chronic rheumatism, there being but little disorder of the above functions attending them. In forming a diagnosis, the temperament, habit of body, age, and mode of living should be taken into consideration. Dr. HAYGARTH observed, that only 14 patients out of 300 ill of chronic rheumatism had swelling in the seat of disorder. It should, however, be recollected, that when chronic rheumatism affects the bursæ mucosæ, and theæ of tendons, particularly those of the knee joint, considerable tumefaction takes place. Although the gout, in its chronic form, is still more fugitive than when acute, and thus approaches nearer to the nature of rheumatism, yet it is much more disposed to seize the hands and feet than that disease, as well as to be more solitary in its situation. The parts which have been often affected with gout become very susceptible of changes of temperature; and, in this respect, partake of the rheumatic character. Sir C. SCUDAMORE thinks that it is only in this way that any propriety can be attached to the expression *rheumatic gout*; and conceives that gouty and rheumatic inflammations cannot both exist in the same part at the same time, although they may occasionally co-exist in different parts; as when a

patient suffering gout in the usual situations is seized with rheumatism in the muscles of the neck, or in the shoulder, or other parts, in consequence of exposure to currents of cold air, &c. When gouty concretions form, the nature of the complaint will be sufficiently evident.

26. *C.* It is a matter of great difficulty to discriminate between the internal affections characterising *irregular gout*, and similar affections unconnected with this disease, as may be inferred from what has been already advanced on the subject. It is only by applying sound principles of pathology to the investigation, guided by much acumen and experience, that we can expect to distinguish between them. When called to a patient advanced in life, of the irritable and nervous temperament, complaining of violent sufferings, or of various nervous and functional disorders, or of severe spasmodic affection, we should endeavour to ascertain, from the state of the pulse and the temperature of the surface, from the sensations produced by a minute examination, from the appearances of the excretions, and from the history of the case, especially with reference to its causes, and to previous attacks of gout, and to any hereditary predisposition to it, the exact pathological condition upon which the symptoms depend. The existence or non-existence of inflammatory action, or the degree in which either may be mixed up with spasm, or morbid sensibility, should be ascertained. Many writers, both previous to, and contemporary with, Dr. Cullen, considered debility and spasm, with altered sensibility, to be more characteristic of retrocedent and misplaced gout, than inflammatory action; and this opinion seems to have been too generally and often injuriously adopted. But I am convinced, that, in more recent times, the opposite doctrine has been too exclusively confided in, and with little less injury as to the results. — The practitioner, in all such cases, should be guided by pathological inferences derived from the phenomena characterising individual cases; and if he find the pain fixed, the pulse excited, or hard, or oppressed, the skin hot, and the parts tender or painful on pressure, he will deduce the existence of inflammatory action: whereas, if the pulse be weak, small, irregular, or indistinct, and compressible; if the skin be cool, the countenance collapsed or anxious; the surface relaxed and perspirable, the parts tolerant of pressure, and if no unnatural sound be detected on auscultation and percussion; he will infer the presence of functional disorder merely or chiefly, or of spasm, or of depression of nervous power with altered sensibility.

27. *III. PROGNOSIS.* — The prognosis should vary with the form which gout assumes. — *A.* In the *regular acute disease*, a favourable opinion may generally be given, if the internal organs betray no serious lesion of function or of structure. The subsidence of sympathetic fever; improvement in the excretions, the urine ceasing to deposit a sediment, or losing its high specific gravity; a return of the appetite, and of the spirits; desquamation of the inflamed cuticle, with disappearance of the swelling; are indications of recovery. The sudden transference of severe affection from one part to another, especially if accompanied with painful sympathy of the digestive organs, or with nervous symptoms and exquisite susceptibility; or

with irregular fever, and with persistent disorder of the excretions, are signs of a difficult and intractable disease. In this form of gout especially, the prognosis should be influenced chiefly by the state of the excretions; for as long as the stools and urine continue morbid, other signs of amendment will prove delusive.

28. *B.* The prognosis in *chronic gout* is more unfavourable than in the acute, as respects subsequent immunity from the disease. As to recovery from the seizure, the circumstances just stated will influence the opinion of the practitioner, as in the acute variety. In every case, however, the state of constitution and of internal organs, and the effects produced by treatment, should be taken into account, in deciding respecting the duration or the event of the disease. — *C.* *Internal affections* occurring either in the gouty diathesis, or upon the sudden disappearance of the external disorder, are always unfavourable in proportion to their severity, and the vital importance of the parts in which they are seated. When the heart, the brain, or the stomach and intestines, are the seats of *retrocedent or misplaced gout*, the patient should be always considered in the utmost danger; especially if he be far advanced in life, if nervous energy be much impaired, and if judicious treatment has not immediately produced the desired effect. Cases of this description, however, not infrequently recover when appropriate and decided means have been promptly resorted to, and when the constitution of the patient has not been remarkably injured.

29. *IV. CAUSES OF GOUT.* — *i.* *Predisposing Causes.* — These may, as in other diseases, become exciting causes, owing to continued or energetic action. — *a.* *Hereditary disposition* has always been viewed as most influential in the production of gout. CANOGAN, however, attached too little importance to it, and CULLEN too much. It is very probable that it will evince various grades of influence in different classes or states of society; — that it will seem of greater importance in those who live regularly, soberly, and laboriously; and of much less, in those who are indolent, luxurious, or dissipated. Sir C. SCUDAMORE states, that of 213 persons afflicted by gout, 84 could not trace it either to the father's or mother's side. But it is probable, conformably with what has been just stated, that an unusually large proportion of non-hereditary cases will be met with amongst the indolent and luxurious inhabitants of a large metropolis. Of the hereditary cases, 62 were derived from the father, 29 from the mother, 14 from both father and mother, 14 from the grandfather, &c. When both parents have had the disease, a greater number of the children will experience it. Where one parent only has had it, the child or children having the greatest resemblance to that parent will be most liable to it.

30. *b.* *Adult age*, particularly from 25 to 50, is the period at which gout most frequently first appears. Sir C. SCUDAMORE states, that of 209 cases, 26 had the first attack between 20 and 25 years of age; 38 between 25 and 30; 41 between 30 and 35; 37 from 35 to 40; 18 from 40 to 45; 25 from 45 to 50; and 11 between 50 and 55. Gout is rarely met with before puberty. HIPPOCRATES first stated this fact, and it has been confirmed by SYDENHAM and many other writers. HEBERDEN never saw an instance of it. Dr.

SCUDAMORE mentions a case at 8 years of age. I treated one, many years ago, at 11; and am at present attending a boy of 9, recovering from a severe attack in the foot. Very early seizures have generally been observed where the hereditary predisposition has been strong. In the two cases just alluded to, it existed in both parents; and, in one of them, there was great precocity of intellect. In some cases, where the disease appeared very soon after puberty, premature or excessive venereal indulgences seemed to me to have aided in its production.

31. *c.* The male sex is much more disposed to gout than the female.—HIPPOCRATES mentions the non-liability of females until the cessation of the menses. This, however, is not correct; for cases occur at an early age in the plethoric through indolence and high feeding, and in those who have not had children. I met with an instance of it in a female of 27 years of age, who was thus predisposed. Dr. GREGORY observed, in his Lectures, that females subject to gout had experienced menorrhagia, or had become plethoric from ingurgitation; and Dr. CULLEN has remarked, that robust and masculine females, before the menses have ceased, or those in whom they have been very abundant, are not infrequently attacked. The instances of gout which I have seen in this sex, previously to the change of life, have been chiefly in those who had suffered frequent or excessive menstrual evacuations, who had lived very fully and indolently, and who had not been pregnant. The relative immunity of females is evidently owing to their temperance, to their periodical evacuations, and to the discharges and secretions connected with child-bearing.

32. *d.* *Habit of body and temperament.*—Gouty persons are said to have capacious and circular chests, with large full veins, and loose solids; but to this rule there must evidently be numerous exceptions. SYDENHAM remarks, that the gross and corpulent, and those with large heads, are most frequently affected. J. P. FRANK states, that the *gouty conformation* consists of a large and full body, voluminous head, large bone, and thick skin. Sir C. SCUDAMORE found that, of 226 males, 64 were tall and corpulent, 41 middle height and corpulent, 25 short and corpulent, 28 middle stature and bulk, 14 tall and middle bulk, 21 short and middle bulk, &c.; and that of 28 females, 9 were tall and corpulent, 8 short and corpulent, 4 middle height and corpulent, and 4 short and slight. Corpulence usually precedes the disease, and often increases with the progress of it. The gouty generally possess good constitutions, abused by indulgence. The sanguineo-nervous and irritable *temperaments* are the most liable to be attacked by gout, although other diatheses may be also affected.—CADOGAN ascribed gout to three causes, which generally act conjointly; namely, *indolence, intemperance, and vexation*. Taking these in their wide signification, their importance cannot be controverted. In whatever *station of life* they prevail, particularly indolence and intemperance, gout will appear as one of the most frequent results; hence it is not infrequent in butchers, innkeepers, and publicans; and in butlers, coachmen, and porters in wealthy families, as well as in the more easy classes of society. It is, in short, met with

in all occupations which conduce to inactivity and repletion.

33. *e.* *Venereal excesses* are amongst the most unequivocally predisposing causes, especially if associated with the imtemperate use of animal food and of wine; for whilst the former species of excess exhausts the nervous power, the latter occasions plethora, and both combine to impair the functions of digestion, assimilation, and excretion; hence the ancients said that gout was the daughter of Bacchus and Venus. The wines which favour most the production of gout, are champagne, new port, and the clarets; but other wines have more or less influence, and are more productive of the disease than malt or spirituous liquors. Strong malt liquor disposes to it even more than spirits. Dr. CULLEN justly remarks, that gout never attacks those following laborious occupations, or who live chiefly on vegetable food, or use neither wine nor other fermented liquors. SCHENCK, VAN SWIETEN, and other authors, have adduced numerous instances of persons, who, during a life of luxury and indolence, had been subject to this disease, but had never afterwards suffered from it when their circumstances required them to live abstemiously and laboriously. In countries where animal food, and vinous or intoxicating liquors, are little used, gout is almost unknown. The habit of partaking of a great quantity or variety of animal food is not less influential than other kinds of intemperance in causing the disease. Severe study has been considered to predispose to it; but this cause is merely apparent or indirect, others of a less doubtful kind also existing. The depressing passions are not without influence, inasmuch as they weaken nervous energy and the functions of digestion and excretion. A cold and variable climate favours, also, in some degree, the formation of the gouty diathesis; and the changeable weather in spring and autumn, and the cold winds and humid atmosphere of these seasons, have a similar effect. The disease is comparatively rare within the tropics, unless amongst those who have indulged in those habits which are most influential in predisposing to it; and yet two of the severest cases I ever saw, occurred nearly under the equator in Africa.

34. *f.* *Functional disorder of the digestive organs* is one of the most universal causes of gout. Many of the causes already noticed, and of those about to be mentioned, act partly by weakening these organs, and favouring congestion of, or inflammatory determination to, the mucous surface. It is not, however, a state of inflammation of this surface, but rather of vascular erythema, that is thereby generated. Hence the appetite, instead of being impaired, is often increased; and the patient is prompted to take more food than the stomach and collatitious viscera can digest and assimilate. When the appetite is impaired, owing to the digestive mucous surface having assumed a more inflammatory state, frequent attempts are but too often made to excite it by stimulating and savory articles of diet; and the mischief is thereby augmented. Even where functional disorder only exists, inflammatory irritation is superadded, attended by the severer symptoms of indigestion—by acrid eructations; by painful distension and soreness of the epigastrium; by congestion and impaired action of the liver; by interruptions of the passage of bile into the duodenum, accumula-

tions of it in the gall-bladder and ducts, and a redundancy of its constituents in the blood; by acidity of the *prima via*, and an imperfectly elaborated or unhealthy chyle; and ultimately, as will be hereafter shown, by a morbid state of the circulating fluids. But these are merely accessories to the formation of the gouty diathesis; other conditions, particularly vascular plethora, being also required; and this state, with the various other elements of the gouty constitution, is that which is generated, in a greater or less degree, by the causes now passed in review.

35. ii. *Exciting Causes.*—Whilst the foregoing causes act chiefly in generating the gouty constitution, or predisposition, those about to be mentioned are mainly concerned in exciting or developing the paroxysm. The sudden repletion and inflammatory excitement of the vascular system in connection with irritation of the digestive mucous surface, produced by excessive indulgences at the dinner table, frequently occasions a fit in a few hours, when the morbid diathesis is already formed; and, when the excess is repeated, particularly in quick succession, the morbid effect rarely fails to take place. Champagne excites an attack more certainly than any other wine. A lady under my care, and who had not passed her 30th year, always suffered more or less on the following day, after taking a single glass of champagne; but the excessive use of any wine, especially if new or of inferior quality, will produce a seizure. The use of malt liquor during dinner, and of port wine afterwards, will excite it, if active and regular exercise be not taken. Strong malt liquors and spirits will often have a similar effect, especially if much animal food be habitually eaten. It is not only indulgence in wine or other exciting liquors, or the admixture of them, that is injurious; for a great quantity and variety of animal food, and of highly seasoned dishes, which they excite the stomach to receive until it is overloaded, are equally prejudicial. Acidity of the *prima via*, from the imperfect digestion of the mass of different substances partaken of, inflammatory irritation of the digestive mucous surface, disorder of the biliary secretion and excretion, vascular plethora excessively or suddenly increased on each of such occasions, and the accumulation of excrementitious and irritating matters in the blood, are the common consequences of these indulgences. In many cases, not merely acid, but acrid or acro-rancid, combinations are formed by the imperfectly digested substances and the disordered secretions poured into the alimentary canal; and these increase or perpetuate the irritation of the mucous surface, whilst they exert upon the organic nerves a noxious influence, which is more or less manifested throughout the digestive circle, as well as in the extreme parts of the frame.

36. Neglected or constipated bowels, and interruption of any of the excreting functions, will occasionally be followed by an attack, without any cause having occurred that could have acted in any other way than this. Cold seems to operate, partly by suppressing the excretions, and partly by depressing nervous power. Its effects in exciting a paroxysm, whether applied to the general surface or to the extremities, or to any part, are well known. Fatigue and external injury not infrequently produce an attack: and the

injured part is usually its seat; especially in cases of sprains, contusions, or concussions. The passions of the mind, also, have no mean influence. All powerful mental emotions, whether exciting or depressing, will excite a paroxysm; but anger or vexation has this effect in a very remarkable manner. The ancients made Anger to be the midwife of Gout; and CADOGAN considered vexation, in its wide signification, as one of his three great causes of the disease. The depressing passions, particularly fright, severe grief, anxiety, &c., may either occasion an attack, or cause its retrocession, or give rise to a misplaced affection, or to some one of the irregular states of the disease noticed above, particularly in persons who have been formerly affected. Besides these, mental and bodily labour, especially when they abridge the requisite duration of sleep; the sudden cessation of habitual evacuations and excretions, as of the catamenia, hæmorrhoids, the *sudor pedum*, &c.; cold, flatulent fruits or vegetables; and acidulous liquors or beverages, sudden changes of diet or regimen; and whatever disorders the digestive and excreting organs, or suddenly impresses the nervous system; may excite the gouty paroxysm, either when the predisposition has been fully formed, or when an attack has been experienced. It is from a combination of two, or several, or even of many causes, that the disease is occasioned, especially if it appear independently of any hereditary taint. In a few instances, this taint seems almost sufficient to produce it, without the aid of any manifest intemperance. This remark was made by GALEN, and HOLLER and others have confirmed it. Cases sometimes, also, occur of persons entitled by both parents to be subject to the disease, who have escaped it, although they lived intemperately. QUARIN states, that he knew two brothers, sons of gouty parents; one of them lived soberly and laboriously, yet was horribly affected with gout; the other exposed himself to its common causes, and altogether escaped it: but these are rare exceptions from the general course of events.—It appears that females frequently acquired gout in ancient times, inasmuch as SENECA (*Epist.* 95.) mentions the circumstance as a proof of the depravity and luxury of his age.

37. V. The PATHOLOGICAL CONDITIONS, on which gout depends, may be inferred from what has been already advanced as to its causes and phenomena.—a. The older writers imputed it to a peculiar morbid humour existing in the blood. This *materia morbi* has been somewhat differently explained.—GALEN considered that it may be phlegm, or a mixture of phlegm and bile, or even blood, or all these, or simply a crudity of the circulating fluids; and that the gouty concretions arise from the crude humours.—PSELLUS believed that it is a thick humour generated and collected by an atony of the nutritive faculty.—ALEXANDER TRALLIANUS contended, that the defluxion of humours occasioning gout is various, according to the local changes and symptoms existing in different cases—that they are bilious, phlegmatic, melancholic, or even sanguineous; and that these occasion pain by getting between the tendons and ligaments, and distending and irritating them.—ÆTIUS maintained the disease to arise from a redundancy of humours caused by weakness of the part affected.—CÆLIUS AURELIANUS assigned the remote cause of gout with great accuracy, and

explained its nature in a nearly similar manner to the preceding writers. — PAULUS ÆGINETA considered that a preternatural humour and a weakness of the parts combine in producing the disease; and that the remote causes, which he enumerates very correctly, generate indigestion and a cacochymy, whence proceed various morbid humours which are bilious, melancholic, or sanguineous; but, for the most part, pituitous and crude, owing to excess of food and want of exercise. He attributed topi or chalk-stones to thickness and viscosity of the humours, and the chronic or protracted forms of the disease to the admixture of several of these humours.

38. The doctrine of the humours, and the manner they give rise to arthritic complaints, have been fully explained by MACROBIUS (*Saturnalia*, vii. 4.). Mr. ADAMS, in the learned notes to his translation of PAULUS ÆGINETA, remarks that the theory of the humours, notwithstanding its being at present in little repute, accords better with the phenomena of the disease, and is a more successful guide to practice, than any hypothesis recently advanced. A similar preference to it has been given by SPRENGEL. It should also be mentioned, that the ancients, particularly those just noticed, recognised the hereditary character of the disease, and peculiar diathesis of gouty persons. The opinions of the Arabian writers are not materially different from those just stated. The most interesting production on the disease that has appeared, was written by DEMETRIUS PEPAGOMENOS about the middle of the 13th century, and was published at Paris in 1558. He states the remote causes of gout to be long-continued indigestion, repletion with food, drinking too much wine, venereal excesses, indolence or unaccustomed exertion, and retention of the natural secretions; the venereal excesses, especially, weakening the tone of nervous parts. These causes give rise to imperfect digestion, and the accumulation of excrementitious superfluities requiring to be evacuated from the system. When these excrementitious matters are retained, morbid humours are produced, and collected in the affected joints. This very ingenious writer further remarks, that when crudities or morbid humours are formed in the system, those parts which are vigorous cast them off; but that those that are weak are unable to accomplish this; and hence collections of such humours take place in them.

39. *b.* Many of the writers of the 16th, 17th, and 18th centuries were induced, by the appearance of the urine, and the concretions formed in the joints, to account for the phenomena of the disease upon chemical principles. — PARACELSUS first, and HOFFMANN and others long afterwards, ascribed the local and constitutional affections to the presence of tartaric salts in the blood, — an opinion very generally adopted until the middle of the last century. More recently, FORBES, PAR-KINSON, WOLLASTON, HOME, BRANDT, and others have endeavoured to show that there is always a redundancy of uric acid in gouty persons; and, as will be shown hereafter, there can be no doubt that the constituents of this acid exist in them in excess. But this species of change is merely one of the elements of the gouty condition. The connection of the disease with plethora was very justly insisted on by Dr. CULLEN; and Dr. PARRY conceived that the paroxysm had a salutary in-

fluence in reducing a plethora relatively great, in restoring the balance of the circulation, and in determining the blood from internal and vital parts to the extremities. Here, again, is a part adduced for the whole of the mischief. Dr. SURTON supposed that the cause of disorder is seated in the alimentary canal; but he attempted nothing beyond this very indefinite explanation. BROUSSAIS is more precise, if he be not more correct, in stating gout to be one of the several morbid manifestations depending upon inflammatory action in the gastro-intestinal mucous surface. In this opinion he has been pretty closely followed by ARMSTRONG, MACKINTOSH, and several writers of his own country. Dr. BATEMAN, Sir C. SCUDAMORE, and Dr. BARLOW have ascribed the disease to vascular plethora. Dr. BARLOW, especially, insists upon its inflammatory and plethoric nature, but pushes his doctrine too far; whilst he overlooks the connection of plethora with other morbid conditions.

40. *c.* It is indispensable to a correct view of the subject, to comprise all the elements forming the constitutional and local affections to which the term gout has been applied. If we analyse the numerous phenomena preceding, constituting, and following the disease; if we connect these with the causes most essential to their production; and if we refer to those agents which increase or diminish the severity of the symptoms; we must necessarily arrive at the conclusion, that gout does not depend upon one morbid condition only, but upon several; that neither the superabundance of excrementitious matters in the blood, arising from imperfect or effete assimilation — from the ultimate results of animalisation; nor vascular plethora, absolute or relative; nor gastro-intestinal irritation; nor gastro-hepatic disorder; is individually sufficient to explain all the changes constituting the disease; although they may be sufficient when viewed in connection. But, even when thus considered — especially if we push the analysis sufficiently far — some antecedent and concomitant lesion must be inferred. If we view the several causes in the connection and succession in which they usually give rise to gout, we must necessarily conclude, that the organic nervous energy is impaired or exhausted by them; and that, as the organic class of nerves bestows its influence on the digestive, the secreting, and excreting functions, exhaustion of its powers will impair the functions of the organs which it supplies. The necessary consequences of such impairment will be imperfect digestion and assimilation, torpor of the liver and bowels, impeded and disordered secretion and excretion, redundancy of excrementitious matters in the circulation, and vascular plethora, arising from deficient excretion, and from a continued supply of nourishment aided by a stimulated appetite. These may be viewed as the elements of the gouty constitution or diathesis; and, when it is formed, the local action will be excited by either, or by several, of the causes mentioned above (§ 35, 36.). That most of these causes affect the organic nervous influence more or less directly, is shown by the impaired or otherwise disordered functions of the organs more especially endowed by this system. To functional disorder and morbid sensibility succeed the accumulation of effete and irritating matters in the blood, and excited

vascular action, either local or general, or both. These matters aggravate the morbid sensibility and irritation, particularly in situations most prone, by previous disorder or debility, to experience either or both.

41. It is, however, not easy to explain satisfactorily wherefore the morbid action should manifest itself in the extremities, and assume peculiar characters, otherwise than by referring both circumstances to the previous change produced in the system—to the antecedent diathesis, either original or acquired; and to the morbid condition of the nerves, and of the exhalations and secretions of parts most remote from the centres of nervous power and of circulation. Weakness of the remote nervous ramifications will necessarily influence the circulation and secretions of the parts which they supply; and when the blood abounds with excrementitious matters, the exhaled and secreted fluids will necessarily possess preternatural or morbid properties, which will affect the sensibility of the extreme nerves, and irritate the tissues in which they are deposited. There are various phenomena, especially the sudden transition of the affection—which is sometimes as quick as electricity—from one part to another, that cannot be explained otherwise than by referring them to the organic nervous system. If we consider the intimate connection that exists between this system and the rest of the economy, and particularly the influence which it exerts upon the vascular system, which it supplies throughout; and view both in their intimate relations with one another, and with the rest of the frame,—if we contemplate them as intimately interwoven together—as possessing numerous and diversified communications with all the viscera and compound structures,—we shall easily conceive, that the altered sensibility existing in one part of this nervous circle may readily be transferred to other and distant parts, with the varying state of nervous influence, and with the several causes which may suppress it in its existing seat, or derive it to other organs; that a change in the state of the organic nervous influence, when preternatural or intense, may very obviously affect the capillary circulation and vascular action; and that, both nerves and capillaries being thus affected, the exhalations and secretions of the part will be also changed, particularly when the fluids circulating to it are in excess, or abound with excrementitious matters; the alteration of the fluids, both circulating and secreted, exalting the morbid sensibility and vascular irritability, and perpetuating the suffering, until the cause is removed, or both conditions are exhausted.

42. If this view be correct, several disputed matters connected with the disease will be more readily explained. For when the predisposition or diathesis is formed, and the organic nervous influence is morbidly affected in one or several parts, and the vascular system is inordinately repleted, causes affecting either the one or the other will not infrequently transfer the morbid action from one seat to another. The local affection of gout being the external manifestation of a constitutional disease, the suppression of it in one part will often be followed by its appearance in another; and its spontaneous extension to a new situation will as frequently de-

rive it from its former seat;—for as long as the constitution continues in fault, nervous power being impaired, the vascular system overloaded, and the blood abounding in excrementitious matters, some organ must experience more or less prominent disorder. This view of the nature of gout further enables us to account for the primary seizure of an internal part or viscus; for, in proportion to the deficiency of nervous power, or to the abundance or vitiation of the circulating fluids, or to the weakened or congested state of some viscus, will the disposition to a misplaced or lurking form of gout exist; the vital manifestations being incapable of developing the disorder in the extremities, owing either to their impairment, or to the extent of the derangements just mentioned, or to both circumstances conjoined.

43. VI. TREATMENT.—i. The *Opinions of the Ancients* as to the treatment of gout, are in many respects as deserving of notice as those of modern writers. Indeed, there is little difference between the views of some of the former on this subject, and those of the latter. As at the present day, so in ancient times, were cold applications to the part, and colchicum internally, advised by some and condemned by others; so also, as may be seen from the *Tragopodagra* ascribed to LUCIAN, were numerous nostrums landed for the complaint, as well as a rational treatment pursued by the regular practitioners of physic; and so also, as at the present day, the habits and irregularities of the patient brought discredit on the science of the physician, and led to the too general adoption of the opinion of OVID, that—

“Tollere nodosam nescit medicina podagram.”

44. HIPPOCRATES recommended purgatives by the mouth and by injection, and cooling applications to the part. In the more chronic cases, he advised means similar to the moxa of the Japanese.—CÆLIUS also prescribed refrigerant applications to the affected part; but he likewise had recourse to warm fomentations conjoined with anodynes, and to depletions.—ARÆTEUS seems to have trusted chiefly to hellebore, and to applications of wool moistened with various substances, as oil, oxycrate, &c.—GALEN commenced the treatment of gout by evacuating offending matters by bleeding and purging; he afterwards had recourse to discutient applications.—CÆLIUS AURELIANUS directed blood to be abstracted from the part by scarifications, and sponges squeezed out of hot water, or oil and water, or a decoction of fenugreek, to be afterwards applied. He also prescribed gentle emetics and apæient clysters. He disapproved of burning the parts, and of the indiscriminate use of narcotics; but advised warm bathing, spare diet, emollient ointments, and afterwards gentle exercise. He enjoined complete abstinence from the commencement of the attack; and at its decline he prescribed a medicine nearly the same as the Portland powder.—ORIBASUS confided chiefly in bleeding and purging, especially in plethoric persons, and in the spring. AËTIUS evacuated redundant humours by these means; and afterwards endeavoured to strengthen the parts.

45. ALEXANDER TRALLIANUS adopted a treatment which he viewed as appropriate to his pathology of the disease. In cases proceeding from a bilious humour, as indicated by burning heat and

the absence of swelling, he prescribed chologogue purgatives, consisting chiefly of cathartics and bitters conjoined, and cooling anodyne applications to the affected parts, with spare diet. When occasioned by a phlegmatic humour, indicated by the absence of heat and redness, he considered calefacients to be beneficial, and refrigerants injurious; and recommended a combination of purgatives and attenuants, as hellebore, thyme, cumin, &c. After purging, he directed warm attenuants internally, and calefacient anodyne cataplasms to the external affection. When there was general fulness of blood, or determination to the affected joint, he advised bloodletting, and abstinence from wine and animal food, and discutients to the part. He has remarked, that some insist upon taking medicines to allay at once the violence of their pains, not choosing to submit to a methodical treatment; but that he does not approve of this practice. For this purpose, he adds, the *hermodactylus* is particularly trusted to; and he admits that it seldom fails to remove a paroxysm; but he also affirms that it occasions more frequent returns of it. The identity of *hermodactylus* and *colchicum* is highly probable, as maintained by PROSPER ALPINUS, Sir H. HALLFORD, and others. ALEXANDER has further stated, that some endeavour to correct the prejudicial effects of this medicine by adding to it cumin, mastic, or ginger, thinking that its action is narcotic; but this he affirms to be a mistake; for in that case it could not prove cathartic. He admits, however, that these things may correct its bad effects upon the stomach; and he therefore prescribes a combination of the *hermodactylus* with aniseed, pepper, and myrrh, or with aloes, scammony, elaterium, colocynth, &c. He preferred, however, the *coronopodium* (which Mr. ADAMS, in his learned commentaries on PAULUS, believes to be the buckthorn plantain or *plantago coronopus*), as it procures evacuations and relief from pain, without injuring the stomach.

46. PAULUS ÆGINETA advised a nearly similar method to that adopted by ALEXANDER. He employed chologogue purgatives for the evacuation of bilious humours, when he inferred gout to arise from this cause; and numerous cooling and anodyne cataplasms to the affected part, with a refrigerant and diluent diet, avoiding repletion and the use of heating dishes or liquors, as well as mental emotions and venereal indulgences. In the sanguineous form of the disease, and in the first attacks, he enjoined bloodletting and purgatives; the latter consisting chiefly of a combination of colocynth, aloes, black hellebore, and scammony. Some, he has remarked, have recourse to purging with *hermodactylus*; but it is bad for the stomach, producing nausea and anorexia, although it removes the disease very speedily. In gout from a mixture of humours, he also had recourse to depletions in early attacks; but, after frequent seizures, he considered the loss of blood injurious. Besides these, he directed a variety of both internal and external means; many of which deserve adoption, and are similar to those hereafter to be noticed. With respect to *prophylaxis*, he advised a moderate use of wine, exercise, and frictions of the joints, morning and evening, with oil triturated with salt.

47. The opinions of the Arabian physicians differ not materially from those of the Greeks.—

SERAPION, AVICENNA, and RHASES recommended evacuations and the *hermodactylus*.—HAILY ABAS directed bloodletting in cases proceeding from sanguineous plethora; and used cooling applications to the joints. For the bilious defluxion, he prescribed emetics and drastic purgatives, consisting of scammony, aloes, colocynth, and *hermodactylus*; and for the serous or phlegmatic defluxion, very nearly the same means, the local applications being varied. The treatment adopted by ALSAHARAVIUS was almost identical with that pursued by ALEXANDER, PAULUS, and HAILY ABAS.

48. DEMETRIUS PEPAGOMENOS has justly remarked that the *prophylaxis* of gout is easily prescribed, but followed with great difficulty. It consists in great moderation in eating and drinking, and in avoiding indigestion. Viewing the disease as one of repletion, he ordered evacuations for its cure, consisting of emetics, bloodletting, and purgatives, and with a very judicious reference to the form and stage of the disease. He forbade the use of strong emetics; but vomiting by gentle means he had recourse to at the commencement. In early attacks, and at their beginning, when there was evidence of plethora, he prescribed bloodletting; but he considered it prejudicial in other circumstances, or much inferior to active purging. He was favourable to the use of *hermodactylus* as a purgative, and combined it with aromatics. In other respects his treatment was similar to that of ALEXANDER.

49. The reader will observe, from what has been just stated, how little has been added to our knowledge of this subject by the numerous productions that have appeared since the revival of learning in Europe; and that, although there is much that is trifling, a little that is absurd, and something that is questionable, in the doctrines and treatment of gout adopted by the ancients, there is also much deserving of commendation and adoption.

50. ii. *Treatment of Acute Gout.*—The indications are—1st. To avert a threatened attack;—2d. To allay the symptoms during the paroxysm;—and, 3d. To prevent the return of the disease, by suitable regimen and medical treatment, after the paroxysm has ceased.—A. In order to avert, or to render more mild, a threatened attack, the *premonitory symptoms* should be treated promptly and judiciously. Much suffering and injury to the constitution have arisen from the idea that the paroxysm is a salutary effort of nature, and that the prevention of it may be followed by serious consequences. There is, however, some truth in the opinion; for, as I have shown, the external affection being the outward manifestation of constitutional disease, the suppression or prevention of it in an external part may lead to results still more severe than the impending attack. But it is the suppression of the paroxysm by means which leave the constitutional disorders untouched, or which increase them, that is injurious, and not the prevention of it by remedies directed to the removal of these internal disorders themselves, in which the attack originates. A large dose of an acro-narcotic, as of colchicum, veratrum or veratria, aconitum, &c., has often the effect of suppressing the morbid sensibility, and with it the irritative vascular action of the seizure; and thus frees the patient

from the impending suffering for a time. But it leaves the internal disorders, of which the external is merely a part, in the same state as before, or even increases them; inasmuch as it tends to weaken organic nervous power, to irritate the digestive mucous surface, and to impair the functions of excretion; and the consequence is, either a more frequent return of the precursory symptoms of the attack, or the supervention of some serious visceral disease. The means, therefore, to be had recourse to, in order to avert the paroxysm, should be those only which are calculated to remove the internal derangements, in which it originates. These derangements we have seen to be—weakened organic nervous power; a torpid state of the functions of the liver, with accumulations of bile in the biliary passages and liver; congestion of this viscus; fecal accumulations in the large bowels; collections of mucous sordes on the digestive mucous surface; vascular erythema, or inflammatory irritation of this surface; and the superabundance of excrementitious matters in the circulation. Means, therefore, which will remove these conditions, and prevent their recurrence, will the most effectually avert both a threatened paroxysm, and a return of the disease.

51. Guided by those views, general bloodletting may be employed in robust and plethoric persons. If signs of congestion of the head or of the liver be present, or of inflammatory irritation of the digestive mucous surface, local depletions may be substituted, or used in addition to the general evacuation. The quantity of blood taken away should depend upon the age and strength of the patient, and other circumstances of the case. Hemorrhoidal or other spontaneous evacuations ought to be encouraged by aloetic purgatives, &c. If the tongue be much loaded, and if heartburn, acrid eructations, or nausea be complained of, neither pain nor tenderness of the epigastrium being present, an emetic will generally be of service. But if vascular depletion be indicated, it should be premised. Emetics have been recommended by CELSUS, FABRICIUS HILDANUS, GESNER, STOLL, SCUDAMORE, and others: they will be found most serviceable as here advised; in other circumstances, they are doubtful means, and require much discrimination. If indigestible matters remain in the stomach, emetics should not be withheld; but when there are pain and tenderness at the epigastrium, with determination to the head, they may be injurious.—In almost every case purgatives should be prescribed, although the bowels may have been said to be regular or open; for collections of morbid secretions in the biliary organs, and of fecal matters in the cells of the colon, may nevertheless exist. Therefore, a full dose of calomel, with camphor or with James's powder, or with both, may be given at bed-time, and a stomachic purgative the following morning. The draught here prescribed, I have found most efficient, especially when the bowels are very sluggish; and the frequent repetition of it is attended by no disadvantage:—

No. 233. R. Infus. Gentianæ Comp., Infus. Sennæ Comp. aa ℥i; Magnes. Sulphatis ʒiſs. (vel Sordis Subcarbon. ʒi); Tinct. Cardamom. Co. et Tinct. Sennæ aa ʒiſs. M. Fiat Haustus, quamprimum mane sumendus.

52. If the excretions continue to present, or assume morbid appearances, a small dose of blue pill, or of hydrargyrum cum creta with soap, or

a full dose of calcined magnesia, should be taken at bed-time, and the above draught in the morning, until they assume a natural character. If the precursory symptoms continue nevertheless, I agree with Sir C. SCUDAMORE in considering that the constitution is labouring under the causes of the paroxysm, almost as much as if the attack had been developed, and that the treatment required during the paroxysm should be resorted to. If the means here recommended restore the functions to a healthy state, abstinence or moderation in diet, regular exercise, especially on horseback, mental quietude, and early hours, should be strictly observed.

53. B. The Treatment of the Paroxysm should be varied according to the age, strength, and habit of body of the patient, to the predisposing and exciting causes, to the duration and characters of the paroxysm, and to the frequency and severity of the previous seizures.—a. Bloodletting is required in the plethoric and robust, and in early attacks, when the constitution is unbroken, and the inflammatory diathesis evidently exists. In these circumstances it has been advised by CELSUS, GALEN, ALEXANDER, HORSTIUS, RIVIERUS, JUMELIN, LE TELLIER, SYDENHAM, PATTEN, HUXHAM, CULLEN, HOSACK, MUSGRAVE, MACBRIDE, DE VERNERIL, HERFORDEN, SCUDAMORE, &c. It has been too strongly insisted upon by HAMILTON, RUSH, and BARNOW; whilst it has been considered injurious by TRAMPPEL, BARTHEZ, HALLÉ, and GUILBERT, unless when the inflammatory action is very manifestly developed in some internal organ; or in strong plethoric persons, when the general vascular excitement is very great.—The practitioner should be guided as to the extent of the depletion, by the circumstances above alluded to; keeping in view the fact, that the disease is one more of irritation than of inflammation; that the vascular excitement is in great measure the consequence of the morbid sensibility, and will subside as it is subdued. Local depletions are often preferable to general bloodletting, particularly when tenderness, or fulness of the epigastrium or hypochondria, is present, and will generally be sufficient to remove hepatic congestion, and vascular excitement of the gastro-enteric mucous surface. When bloodletting is clearly indicated, it should not be delayed; as the benefit it is calculated to afford will be diminished very materially by delay; the debility consequent upon unmitigated irritation, rendering the deferred depletion of little or no avail.

54. b. Alvine evacuations are of less doubtful efficacy even than vascular depletion.—Emetics are sometimes of service at the commencement of the paroxysm, when the symptoms indicating (§ 51.) the propriety of resorting to them are present. In some cases they mitigate the attack; whilst in others they have little or no effect upon it. They ought to be employed with caution. When the case requires both vascular depletions and an emetic, the latter ought not to be exhibited until the former has been carried into effect.—Purgatives are of the most unequivocal benefit. Many of the empirical remedies employed against the disease are serviceable only in as far as they increase the alvine excretions. As vascular congestion of the liver, and accumulations of bile in the biliary passages, are often connected with the production of the fit, such purgatives as promote

the circulation in this organ, and increase its excreting function, should be selected. With this view, from five to ten grains of calomel, with four or five of James's powder, may be given at bedtime, and the draught prescribed above (§ 51.) early on the following morning. If these do not act in the course of a few hours, a dose of magnesia, and of sulphate of magnesia in any aromatic water, may be taken, and repeated until the bowels are freely opened. Purgatives were actively employed by the ancients, *veratrum* and *harmodactylus* having been chiefly used with this intention. RHASES advised a cathartic to be repeated eight times. RIVERIUS, RIBDLIN, THULENIUS, CADOGAN, and most English writers, have recommended them. SCHROEDER preferred the preparations of rhubarb; and these, conjoined with magnesia, or any of the other purgatives in common use, may be prescribed. Sir C. SCUDAMORE prescribes the *colchicum* in the first aperient draught, giving from one to two drachms of the acetic preparation, neutralised by magnesia, and conjoined with the sulphate of magnesia. This medicine he repeats at intervals of four, six, or eight hours, according to its action, and the urgency of the symptoms. Although this is amongst the mildest of the preparations of colchicum, especially when its acetic acid is neutralised by magnesia, yet I have seen it, in this dose, productive of serious effects; and it is more likely to be injurious when it fails in acting upon the bowels; for in this case its influence is exerted upon the nervous system, and not upon the excreting functions—the morbid sensibility being partially suppressed by it, but the source of disorder remaining untouched. The consequences are, either a frequent return of the fits, or a continuance of the internal affections in aggravated forms, or the superintention of some one of the irregular states of the disease. Where biliary accumulation or congestion of the liver exists, a large dose of colchicum, unless conjoined with an active stomachic purgative, may, in the early stage of the paroxysm, so suddenly suppress it, as to give rise to the serious affections alluded to under the head of retrocedent and misplaced gout (§ 18. 21.).—This is no supposititious case, for two such instances have fallen within my own observation, one of which has been already adverted to (§ 19.).

55. In early fits of the disease, when much inflammatory excitement exists, *colchicum* may be conjoined with the cooling saline purgatives, and with magnesia, as Sir C. SCUDAMORE advises; but the dose should be much less than just mentioned, and ought seldom to exceed half a drachm of any of the fluid preparations; and it should not be given more frequently than thrice in the day, until the effects are observed; as even in this quantity, I have seen it have, in some constitutions, a very remarkably sedative influence, producing even serious symptoms. In several persons, and three of these members of the profession, I have observed that even twenty drops of the mildest preparations of colchicum could not be taken without most distressing internal irritation, and a sense of sinking being produced. This effect still more frequently occurs in the atonic or chronic states of the disease. Therefore, when the patient is either advanced in life, or has suffered repeated attacks, or is possessed of

weak constitutional power, the combination of colchicum with antacids, and ~~with~~ stomachics, or the spiritus colchici ammoniatus, will be most appropriate; and either the infusion of senna, or of rhubarb, or the decoction of aloes, may be added to them, in such quantity as may be required to operate freely on the bowels.

No. 234. R. Infus. Caryophyllor. Infus. Sennæ Comp. ʒi 3vj; Magnes. Calcinate ʒj; Tinct. Rad. Colchici, ℥xxv. (vel Aceti Colchici 3ss.); Spiritus Pimentæ, 3ss. M. Fiat Haustus, ter in die sumendus.

No. 235. Infusi Aurantior. Comp., Infus. Rhei, ʒi 3vj; Magnes. Carbon. ʒj; Vini Seminis Colchici 3ss. (vel Spirit. Colchici Ammon. ℥xxv.); Tinct. Cardamom. Comp. 3j. M. Fiat Haustus, sexta quæque hora sumendus.

No. 236. Decocti Aloës Comp. 3vj; Aquæ Menth. Virid. ʒivss; Tinct. Seminis Colchici 3ss.; Spirit. Ammoniac. Arom. 3j. M. Fiat Haustus.

No. 237. Sodæ Sub-carbon. 3ss.; Vini Colchici (vel Spirit. Colchici Ammon.) 3ss.; Infusi Sennæ Comp., Infusi Aurant. Comp., ʒi 3vj; Spirit. Lavand. Comp. 3j. M. Fiat Haustus.

56. It will often be necessary, especially when the countenance is sallow or bilious, the hypochondria and epigastrium full, or tender on pressure, to exhibit on alternate nights, or even every night, a dose of calomel, or of blue pill, with James's powder. But care should be taken that the mercury does not produce its specific action, which very generally will be prevented by the active exhibition of the purgatives just mentioned. Where much febrile excitement exists, James's powder, or some other antimonial, with or without an anodyne, according to circumstances, should be prescribed; and if nervous power be much reduced, two or three grains of camphor may be either substituted for these, or conjoined with them. The colchicum may be given in the form of pill, the powder being combined with camphor and the watery extract of aloes, or the aloes and myrrh pill, three or four doses being taken in the 24 hours, and as much of the purgative as will operate sufficiently on the bowels. The action of colchicum is exerted chiefly on the digestive mucus surface and liver, the secreting functions of which it manifestly augments. When it does not pass quickly off by the bowels, it is partially absorbed, and increases the functions of the kidneys. It was employed by the ancients, and physicians of the middle ages, and entered into the composition of most of the gout specifics of every epoch. STURGEON introduced it into regular practice in modern times, and used it chiefly as a diuretic. Mr. WANT brought it into use in 1815 as a cure for gout. Since then it has been very generally, and but too often injudiciously, employed in this and in other diseases.

57. Cathartics are not equally suited to all cases. Where the bowels are very torpid, the liver congested, and the tongue loaded, they (see Appendix, F. 181. 266. 378. 430.) are necessary, and it is chiefly by them that we can remove the excrementitious matters abounding in the circulation. But in other instances, particularly when these disorders do not exist, or when the bowels are easily relaxed, or are irritable, and when the patient is nervous and debilitated, aperients or laxatives, and saline medicines with the alkali in excess, or calcined magnesia with or without colchicum, will be more serviceable than active purgatives, unless conjoined with tonics, aromatics, or stimulants.—Neutral salts, taken so as to act gently upon the bowels, have generally also a refrigerant effect; and being partially absorbed,

exert a beneficial influence on the circulation and functions of the kidneys. When the saline medicine is conjoined with an alkali or with magnesia, these effects are still more manifest, and not only are the intestinal discharges increased, but the urine is rendered more copious and natural. Colchicum judiciously combined with these will often allay pain, bring down the pulse, and promote the secretions from the liver and kidneys; but if it occasion depression or nausea, it should be discontinued. Although purgatives are unequivocally beneficial when employed as here advised, yet SYDENHAM, WARNER, and most French writers have condemned the use of them in this disease. Even HEBERDEN does not appear favourable to them. This, however, evidently arises from either an injudicious use of them, or inappropriate modes of exhibiting them.

57. *c. Diuretics* are beneficial in this disease, in as far as they promote the removal of excrementitious matters from the circulation. The saline substances already alluded to, and the alkalies, are, upon the whole, the most preferable of this class of medicines. Of the former, the citrates of potash and of soda, the acetate of potash, and the sulphates of soda and magnesia, are to be preferred; and of the latter, the fixed alkalies, and magnesia. M. MAZUYER recommends potash and its acetate, from an opinion that the presence of uric acid in the blood is a principal cause of the disease. Alkalies in various forms have been long recommended in gout. In the form of soap, they have been prescribed by BOERHAAVE and WHYT. Their subcarbonates were used by TOZZI, QUARIN, BLANE, GARDNER, WOLLASTON, and others. The alkaline earths have, however, been preferred by several writers, especially when acidity of the *prima via* existed. WHYT and BLANE were favourable to lime-water, and preparations of chalk, in these circumstances. Magnesia, both calcined and carbonated, has been generally employed, and is preferable, upon the whole, to any other absorbent, inasmuch as it acts gently upon the bowels and kidneys, without weakening the digestive mucous surface. Its effects in removing the morbid state of the urine in gouty subjects, which has been so well described by Dr. PROUT, and noticed above (§6.14.), are very remarkable. The liquor potassæ, or BRANDISH's alkaline solution, exhibited in a bitter infusion, with the extract of taraxacum, or in the decoction of taraxacum, will also be found useful, especially when chronic disorder of the liver is present; small doses of blue pill, or of PLUMMER's pill, with soap, being given at bedtime, and the emplastrum ammoniaci or the emplastrum picis compositum conjoined with it, being placed on the epigastrium, and right hypochondrium. The preparations of squills, or the spiritus ætheris nitrici, may be given with the saline and alkaline substances just noticed, when the urinary secretion is scanty.

58. *d. Diaphoretics* during the paroxysm have been recommended by some writers, and disapproved of by others. There can be no doubt of perspiration being a favourable evacuation in this, as in many other diseases, inasmuch as excrementitious matters are thereby removed from the system. QUARIN remarks, that those who sweat much, or void much urine, are rarely afflicted with gout; and the reason is obvious. Sir C.

SCUDAMORE states, that sudorifics should be given with some caution, as they tend to debilitate the stomach; and this is doubtless the case with respect to the common preparations of antimony, although RIODIUS, RIVIERIUS, VICAT, BRANDIS, and HUFELAND prescribed them when inflammatory fever accompanies the paroxysm: and in this state they are beneficial, especially when conjoined with gentle refrigerants and narcotics. DOVER strongly recommended his celebrated powder in this case; but he employed nitre, instead of the sulphate of potash of the more modern preparation. Camphor, however, in doses and combinations appropriate to the circumstances of the case, is a most unexceptionable medicine, inasmuch as it has an anodyne effect, whilst it promotes the exhalations and secretions. It may be conjoined with James's powder, or with mercurials, or with anodynes, or with all of them, according to existing pathological states. It has been almost entirely overlooked by recent writers on the disease, although it was recommended by LENTIN, CHRESTIEN, COLLIN, BANG, and OSIANDER. I have prescribed it frequently, especially in the more chronic and irregular forms of gout; and found it, particularly in conjunction with opium, or the acetate or muriate of morphia, a most valuable remedy. The decoction of guaiacum was much employed by SABAROT, TODE, WEISMANTEL, GRUNER, SMETIUS, THEDEN, AASKOW, ACKERMANN, DUNCAN, and BALDINGER; but it is more suitable to the atonic or chronic states of the disease than to the acute. It is, however, sometimes useful, conjoined with alkalies and anodynes, after the bowels have been freely evacuated, in old cases and in debilitated habits. It is most beneficially exhibited in the form of compound decoction, as prescribed in the Edinburgh and Dublin Pharmacopœias; or in that of the ammoniated tincture, when debility is considerable.

59. *Warm baths and vapour baths*, simple and medicated, have been long recommended as diaphoretics, for the removal of gout in its various forms. ACTUARIUS, ZACUTUS LUSITANUS, LENTIN, GIRAULT, QUARIN, BRANDIS, ALBERS, SCHACHER, RULAND, PALLAS, WATZ, MOLWIZ, OLIVER, and INGRAM prescribed them. Sulphuretted baths, warm salt-water baths, and aromatic warm or vapour baths, have been favourably noticed by THILENIUS, QUARIN, ALBERS, and HUFELAND. The simple vapour bath was much praised by MARCARD and BLECHBOUGH; and warm baths prepared from a decoction of emollient herbs, by PELLAGUS and others. The camphorated vapour bath promises to be more serviceable than any of these, although they are severally of advantage when appropriately used.

60. If the patient be young and robust, or suffering a first or early attack, or if the constitution be not materially impaired, and especially if vascular excitement and pain be very great, the several means already noticed may be so prescribed as to produce decided antiphlogistic and refrigerant effects. The antiphlogistic treatment, to the fullest extent, has been advised by LANGIUS, WERLHOF, HUFELAND, BARLOW, and others; and in the circumstances just specified, or even in others more equivocal, it is more or less beneficial. — *Refrigerants*, as nitre, muriate of ammonia, &c., have been given internally by

MARCUS, and others; and, in the above circumstances, they may be serviceable; but in persons of weakly habits, and in the more protracted cases, their effects should be carefully watched. In most instances, the saline aperients and diuretics prescribed above prove sufficiently refrigerant; and the more cooling diaphoretics, particularly camphor julep, the solution of the acetate of ammonia, and spirits of nitric ether, have a similar effect.

61. *c. Narcotics* have been long employed during the height of the paroxysm, both internally and to the affected part. *Ætius*, *Zacutus Lusitanus*, *Mayerne*, *De Launay*, and many others have recommended them.—*Opium*, either in its crude state, or in the form of *Dover's* powder, or of *Sydenham's* laudanum, has been preferred by *De Heide*, *Doering*, *Nunn*, *Warner*, *Matthæi*, *Kinglake*, *Marcus*, *Sutton*, *Guilbert*, &c. Several writers have, however, chosen either the black drop, or *Battle's* solution, whilst contemporary practitioners have recourse more frequently to the acetate or muriate of morphia. More advantage, however, will accrue from the judicious combination of the opium with other remedies, than from a selection of either of these preparations. Opiates ought never to be prescribed until fecal accumulations and morbid secretions have been evacuated. If prescribed earlier, or otherwise improperly used, they are liable to the same objections as have been urged against colchicum—one of the effects of which, it should be recollected, is anodyne. *Dr. Cullen* remarks, that although they mitigate the severity of the fit, they occasion its return with greater violence; but this objection holds equally strong in respect of all narcotic and anodyne substances employed without sufficient regard to the removal of those morbid conditions of the internal viscera upon which the disease chiefly depends. It is, therefore, indispensable to a successful treatment, to evacuate morbid matters previously to the use of these medicines; and to promote the action of excreting organs, whilst we employ them. In weakly habits, or where there seems to be a state of asthenic or irritative action in the fit, and particularly if the external affection shifts its seat, the opiate should be conjoined with camphor, in doses proportioned to the urgency of the nervous symptoms, or of vital depression. This combination will promote the cutaneous excretion; the camphor preventing any tendency to the retrocession or suppression of the paroxysm that may exist, or that the opium may occasion. *Hamilton*, *Plenciz*, and some other writers have advised calomel to be conjoined with the opium. When chronic disease of the liver is present, the practice is judicious; but purgatives should also be prescribed, and the effects carefully watched. The mercurial ought to be withdrawn when relief is obtained, or as soon as it evinces its specific action. Where there is much febrile excitement, the opiate will be usefully conjoined with *James's* powder, or other antimonials, or with *ipercacuanha* and refrigerants. The acetate or muriate of morphia should be preferred when opium occasions headach, gastric disorder, or other unpleasant effects; and either may be given with aromatics, camphor, &c., according to the peculiarities of the case. A large dose of the extract of *white poppy* may be directed in similar circumstances.

62. *Aconitum* has been recommended chiefly by Continental physicians, and is certainly a medicine of greater efficacy than is generally supposed in this country. It has been favourably noticed by *Stroeller*, *Boehmer*, *Reinhold*, *Stoerck*, *Quarin*, *Stoll*, *Vogel*, *Collin*, *Murray*, *Thickness*, *Warnung*, *Zadig*, *Barthfz*, and *Brera*; but it is more appropriate to old or chronic cases, or to weak habits of body, than to recent attacks attended with general vascular excitement. The powdered leaves, or the extract, may be used. Besides its narcotic effect, it produces a very decided action on the skin. *Belladonna* has likewise been prescribed by *Ziegler*, *Boetscher*, and *Mönci*; *Conium*, by *Percival*, *Solenander*, *Coste* and *Thickness*; the *Humulus Lupulus*, by *Freak*; and the *Lactucarium*, by *Duncan* and *Scudamore*. *Hyoscyamus* is, however, preferable to either of these, when it is desirable to avoid constipation of the bowels. I have, however, seen the belladonna very serviceable in two or three instances; and in these it produced its specific eruption on the skin.

63. *C. Local Treatment in the Paroxysm.*—*a. Leeches* have been applied to the inflamed part by *Werloff*, *De Haen*, *Boyer*, and *Mackintosh*; and even *scarifications* have been advised by *Sal-muth*, *Thilenius*, *Riedlin*, *Hoffmann*, *Bauer*, *Reusner*, and *Watts*. *Sir C. Scudamore* remarks, that he has seen, in a few cases, the application of leeches followed by the sudden transition of the inflammation to the other limb, indicating that the constitutional causes were not relieved by the local loss of blood; and that he has generally found the debility of parts and œdema both greater and more lasting after this practice. In three instances, where he directed blood to be taken from the distended veins near the foot, an increase, rather than diminution, of pain was the consequence in two, and much local weakness in the third of them.—*Blisters* applied to the affected part have been recommended by *Bou-vart*, *Riedlin*, and *Stevenson*. *Trenpel* considers them injurious; and *Dr. Cullen* admits the occasional efficacy both of them and of urticat on, but considers them hazardous. They are sometimes, however, useful in the more chronic or asthenic states of the disease.—*Mota*, as a local application to gouty joints, has been resorted to in Eastern countries from time immemorial, and appears to have been known to *Hippocrates* and subsequent ancient writers. Amongst the moderns, *Bose*, *Ten Rhynne*, *Thilenius*, *Pechlin*, *Theveno*, *Acerbi*, *Pallas*, *Kaempfer*, *Valentini*, and *Ingram* have noticed it. *Sir W. Temple* (*Works*, vol. iii.) derived benefit from it in his own case.

64. *b. Fomentations and poultices*, both simple and medicated, have been long advised for gout. *Hornung* and *Riedlin* have directed fomentations with an infusion of tobacco, and *Kunrath* poultices with the leaves of *hyoscyamus*; but, although they may relieve the pain, they relax and weaken the parts. *Alexander Trallianus* has stated, that they occasion a chronic state of disease, and favour the formation of concretions. Poppy fomentation, the vapour of hot water impregnated with aromatic herbs, and various emollient herbs and flowers used in the form of poultice, have been recommended. *Grüling* has advised the application of the infused flowers

of the sambucus; but it is very doubtful whether any of these is truly beneficial. Sir C. SCUDAMORE, however, remarks, that a poultice made with bread, scalded with boiling water, pressed through a strainer to dryness, and then rendered sufficiently soft by the addition of one part of alcohol, and three of camphor mixture, is frequently of service when applied just tepid directly to the affected part, and kept on during the night only. This writer states, that he has employed, with the best success, a lotion composed of one part of alcohol and three of camphor mixture, rendered agreeably lukewarm by the addition of a sufficient quantity of boiling water, and applied by means of linen rags. He remarks, that if the temperature be higher, it is less beneficial; and if it be lower, it is liable to the objections urged against cold applications. — *Warm pediluvia* have been resorted to, but are injurious whilst the inflammation remains. Sir C. SCUDAMORE has seen the symptoms reproduced by their employment at the decline of the paroxysm, and has adduced instances where they caused a metastasis of the local affection. Combed wool, and various other applications, made with a view to accumulate the warmth, and promote the perspiration of the part, have been very much resorted to; and I have seen much relief obtained from soft flannel wrung out of warm water, wrapped about the part, and closely covered by oil-skin; but this practice is open to the objections already noticed.

65. c. *Local refrigerants* have received the sanction of HIPPOCRATES, CELSUS, CAMERARIUS, ZACUTUS LUSITANUS, KOLHAAZ, KOCK, VANDER HAYDEN, BARTHOLIN, Pechlin, BERGIUS, LAZZANI, PEFISCH, and KINGLAKE. Dr. HEBERDEN states, that the celebrated HARVEY applied cold in his own case. Dr. GOOD followed his example in his early attacks, and whilst the vigour of his constitution was not materially impaired; afterwards, when the disease appeared with more debility and irritability of the system, he judiciously refrained from this practice. In strong persons, the application of cold will afford relief, and it may not be injurious; but in other circumstances, it is hazardous. MARCARD, and numerous writers since his time, have shown its bad effects; for, like all other means tending to relieve the local affection, whilst the constitutional disorder remains untouched, it may cause the transition of the disease to some other situation, either external or internal. — The application of *veratrum* or of *aconitine* to the part, in the form of ointment, (*Veratriæ gr. x—xv.; Adipis præpar. 3iv.*), has been recommended by Dr. TURNBULL, but it is liable to the objection just urged. — The leaves of the *Cactus Opuntia* have been used as a poultice, by PAULI and PAFEN; and relief has been derived from the common cabbage leaf. I have seen a steak of raw beef, applied either whilst still warm, or immediately after it was cut from the recently killed animal, produce remarkable relief, and without any consequent inconvenience. It is deserving of further trial. These two latter are popular remedies in some countries. * — External

applications of an active kind are generally either of little benefit, or are hazardous, in the nervous or debilitated; in persons liable to painful affections of the stomach and bowels; in those subject to palpitations or irregular action of the heart, or to disorders referrible to the encephalon; and in those complaining of diseases of the lungs, or of asthmatic attacks. — The tepid lotion and poultice advised by Sir C. SCUDAMORE, and liniments of oil of almonds and camphor liniment, or tepid epithems, are, upon the whole, the safest and best.

66. D. *The Diet and Regimen during the paroxysm* should be strictly regulated. — In this form of gout, especially, the diet should be spare, cooling, and chiefly farnateous. Boiled bread and milk are praised by Sir C. SCUDAMORE; but it sometimes produces acidity; which, however, may be prevented or corrected by the admixture of a small quantity of calcined magnesia. Arrow-root, sago, or panada slightly spiced, will generally be sufficient as long as febrile excitement continues; but in nervous, debilitated, or irritable habits, a little Madeira or sherry, or a dessert spoonful of brandy, may be added to these. As the paroxysm subsides in these constitutions, a little light animal food, and an additional allowance of wine, may be permitted, particularly if the patient's previous habits require the indulgence. The best beverage during the fit is tepid whey, which may be taken in any quantity: it aids the operation of the medicines on the bowels and kidneys. A weak infusion of sassafras, weak black tea, thin gruel, barley water, or other diluents, may be also used; but acid drinks should be avoided. Small quantities of the subcarbonate of potash may be added to these, and they may be rendered more agreeable by a few slices of orange or lemon peel. Grapes and ripe oranges may be likewise allowed, if they be not found to occasion flatulency or acidity. A very restricted diet in the fit has been strongly insisted upon by CRISUS, THRIVERIUS, RIEDLIN, PIETSCH, and CADOGAN, who have justly considered it an important part of the treatment; for, if nourishment be too liberally allowed, or if it be stimulating, from a mistaken notion of supporting the strength, the result will be merely the aggravation of the disease. The patient should not remain in bed for a longer period than is really necessary, but begin to use his limbs gently as soon as possible. SYDENHAM recommends that he should take exercise in a carriage even in the beginning of a fit; but this is seldom beneficial, and therefore unnecessary. An attack has been

Alii marrubium; alii potamogetonem;
Alii urticae ferunt; alii symphytum;
Alii lentes adherunt ex palustribus lectas;
Alii pastinacæ coctam; alii folia persicorum,
Hysocyannum, papaver, cepas agrestes, mali punice cortic
Psyllium, thus, radicem elebori, nitrum,
Fœnum græcum cum vino, grynum, collamphacum,
Cyparissium gallam, pollen hordeaceum,
Brassicæ decoctæ folia, gypsum ex garo,
Stercora montanæ capræ, humanum oletum,
Farinas fabarum, florem asii lapidis:
Coquant rubetas, mares, araneos, lacertas, feles,
Ranas, hyenas, tragelaphos, vulpeculas.
Quale metallum non exploratum est mortalibus?
Quis non succus? Quis non arborum lacryma?
Animalium quorumvis ossa, nervi, pelles,
Adeps, sanguis, medulla, stercus, lac.
Bibunt alii numero quaterno pharmacum:
Alii octono; sed septeno plures.
Alius vero bibens hieram purga:ur.
Alius incantamentis impostorum deluditur," &c.

* The following list of substances, although adduced satirically in the *Tegetrodygia* of LUCIAN, was actually employed by the ancients in the external treatment of gout: —

Terunt plantagines, et apia
Et folia lactucarum et sylvestrem portulacum.

prevented by determined exertion, or by a long walk; but it has also been brought on by the same cause. Dr. SMALL advises the patient to go abroad as soon as the inflammatory action ceases, and argues that gouty persons owe lameness more to indolence and fear of pain than to the disease. Sir C. SCUDAMORE, however, states, that he has seen the too early exertion of the limb produce a relapse. When the pressure of the bed-clothes cannot be borne, the part may be protected by a cradle.

67. *E. Treatment during Convalescence and in the Interval.*—Treatment ought not to be relinquished with the subsidence of the paroxysm, but directed to the restoration of the healthy state of the digestive and excreting functions, and of the strength of the weakened limbs. If these ends be not attained, the patient will be liable either to protracted convalescence, or to the speedy return of the fit. During recovery, the appetite is often in a state of morbid excess, whilst the powers of digestion and assimilation are weakened. This seems to be owing to the vascular erethism of the gastric mucous surface, and requires the restraint of the physician, and the self-control of the patient. The meal should be light, and in moderate quantity. Where there is much debility, half a pint of asses' milk may be taken early in the morning, and repeated at night. Animal food ought to be sparingly indulged in; and soups, pie-crusts, pickles, and pastry of all kinds, avoided, as they generally occasion, in gouty persons, acidity of the prima via. The stomach should not be required to perform more than its strength will admit of, nor goaded to exertion by stimulating or heating beverages. Where there is a tendency to plethora or vascular excitement of the digestive mucous surface, or to congestion of the liver, or to determination to the head, this caution ought to be carefully observed. It will, however, be necessary to restore the organic functions by an appropriate use of bitters or other tonics; but these medicines should either be postponed until the secretions and excretions are restored to a healthy state, or be conjoined or alternated with means directed to fulfil this intention. Whilst the tongue continues loaded, mild purgatives or deobstruent aperients are necessary; but purgatives alone will frequently fail of removing this symptom, and restoring the healthy functions of the abdominal viscera, unless tonics are also exhibited. The state of the tongue, in these cases, frequently depends more upon the constitutional disorder and debility, than upon the state of the alimentary canal. It will, therefore, be preferable to conjoin tonic infusions with such a quantity of the infusion of senna or of rhubarb, as will act moderately on the bowels; and to these, either of the alkaline carbonates and the extract of taraxacum may be added. Craving of the appetite is to be referred to debility, or to the cause already adduced; and will generally be removed by tonics, judiciously combined with alteratives and laxatives.

68. In a large proportion of cases, the treatment during convalescence, and in the interval, should consist chiefly of a restricted diet, abstinence from wine and heating liquors, and a careful regulation of the quantity of food to the degree of physical exertion used by the patient. In tolerably sound constitutions, tonics will merely

increase vascular plethora—especially if chalybeates be employed,—unless active exercise be taken, and secretion and excretion be promoted. When there is chronic disease of the liver, or torpor of this organ, or biliary obstruction, mercurial alteratives should be given at bed-time, and an aperient draught with taraxacum early in the morning. The emplastrum ammoniaci cum hydrargyro may also be applied to the right hypochondrium and epigastrium. In nervous, irritable, or debilitated persons, the judicious use of tonics is beneficial. In many cases, the compound decoction of sarsaparilla, the mezereon being omitted, will prove gently tonic as well as alterative; but, when the debility is greater, the sulphate of quinine, or the preparations of bark, are preferable. The infusion or decoction of cinchona, or any of the other tonic infusions, may be prescribed with the alkaline carbonates, and the aromatic spirit of ammonia, and, when the stomach is irritable, with an increased quantity of the carbonates, and taken during effervescence with fresh lemon juice. When the bowels are sluggish, a compound infusion of tonics and aperients may be given in the manner I have just advised; or any of the medicines directed above (§ 50, 56,) may be used; or the compound decoction of aloes may be taken with the compound infusion of gentian, or with the infusion of cascarrilla, or with camphor julep, as recommended by Sir C. SCUDAMORE; an alternative pill, consisting of PLUMMER'S pill and soap, or of hydrarg. cum creta, the compound rhubarb pill and soap, being taken at night.—When there is no tendency to inflammatory action or congestion of the liver, debility of the digestive organs, as well as a sluggish state of the bowels, will be remedied by quinine conjoined with small doses of the purified extract of aloes, or with the aloes and myrrh pill, or with the compound rhubarb pill (see F. 575.). The following draught may be used as a stomachic aperient, and varied according to circumstances; or the pills may be substituted, and taken at dinner or at bed time, in a dose sufficient to keep the bowels freely open:—

No. 238. R. Corticis Cascarrillæ contusæ ʒij; Calumbæ Radicis concisæ ʒjss; Rhei Rad. concisæ ʒij. (vel Follor. Sennæ ʒijj.); Semin. Coriand. contus. et Cardamom. Semin. contrit. aa ʒss; Aquæ Ferventis ʒix. Macera per horas duas, et cola.

No. 239. R. Huius Infusii ʒxi.; Potassæ Carbon. ʒss.; Tinct. Auranti ʒj. M. Fiat Haustus, primo mane, et meridie, cum uccel limonis recentis cochlear, in effervescentiâ impetu, sumendus.

No. 240. Pulv. Ipecacuanhæ gr. xij.; Pulv. Capici ʒj.; Pulv. Rhei ʒij.; Extr. Aloës purif. ʒj.; Extr. Fellis Bovini ʒij.; Saponis Duri ʒj.; Olei Cajuputæ ℥xx. vel q. s. M. Fiat Pilule xl. quarum capiat unam, duas, aut tres, cum prædio, vel horâ somni.

69. The *œdema* and debility of parts consequent on the fit are most marked after a relaxing local treatment, and are frequently such as to require medical aid.—Mechanical support, by means either of a calico or flannel roller, according to the warmth of the season, is generally serviceable, especially if the veins are varicose, or the ligaments weak. The surface of the parts may also be sponged, night and morning, with a strong solution of salt in water, at a tepid temperature; and having been wiped dry, friction should be applied for some time. Frequently, friction should be accompanied by the use of a stimulating and strengthening liniment, consisting of the compound camphor and soap liniments, with the ad-

dition of a little spirits of turpentine and cajeput oil; or *Formula* 308.311. in the Appendix may be employed.

70. F. *The Empirical Treatment of Acute Gout* requires merely a brief notice.—a. *The eau médicinale, Wilson's tincture, and Reynold's specific*, are in most general use as specifics for the cure of gout. The composition of these, however, is not certainly known, although it is generally believed that they are preparations of colchicum of different degrees of strength. Their effects are very nearly the same as those of the tincture and wine of the roots of colchicum; for they all produce, in the dose of a drachm or a drachm and a half, diminished energy and frequency of the pulse, languor, nausea, sickness, terminating either in vomiting or in alvine evacuations, and relief of pain. If the dose be the least in excess—especially in some constitutions—syncope, extreme prostration, cold sweats, violent vomiting and purging, a small feeble pulse, and alarming sinking or insensibility, are the results. *Colchicum*, when employed merely with the view of preventing, or suddenly curing, the paroxysm, and without reference to the removal of the morbid conditions of which it is the external manifestation, is liable to the same objections as are justly urged against the above secret medicines. The consequences of having frequent recourse to them vary in different constitutions, and with the habits and modes of living of the patient: but they commonly are—a much more frequent return of the fit, or of the symptoms indicating its approach; impaired nervous power; debility of the digestive organs; torpor or irregularity of the biliary functions and of the bowels; headaches, and a variety of symptoms referable to the encephalon.—Besides these, I have met with instances of hypochondriasis, melancholy, mental delusions amounting to insanity, paralysis, and angina pectoris, evidently arising from this cause. I very recently saw a case of partial insanity, with Mr. SNUTE, occasioned by the use of Wilson's tincture on the approach of the gouty paroxysm.

71. *Veratrum*, or the white hellebore, or some unknown species of veratrum, was much employed by the ancients in gout; and Mr. MOORE recommended a wine of this plant with laudanum, believing it to be identical with the eau médicinale. Sir C. SCUDAMORE has referred to instances where it produced dangerous effects. It usually causes irritation of the stomach, with a distressing sense of heat, white tongue, thirst, and nervous depression; and, in a larger dose, severe vomiting and purging, with griping pains, and distressing sinking of the vital powers. In the more moderate doses in which it is prescribed, its effects are not so severe, but then it frequently fails of having any control over the symptoms.—The *Gratiola officinalis*, or hedge hyssop, and the *Ranunculus flammula*, have likewise been employed; but they deserve little credit. A tincture of the former, however, has been said to produce effects similar to the eau médicinale. They are both very active irritants of the digestive mucous surface, and produce purgative and emetic effects.—The *Elatium* has been given by Mr. GRÆN, in the infusion of senna, with a few drops of laudanum. It has generally produced slight vomiting, and copious alvine evacuations, and speedily removed the fit.—He recommends flannel, fleecy

hosiery, &c. to be laid aside, and leeches to be applied, when much inflammation exists in the affected part.—The *Ballota lanata* has been employed by Professor BRENA in the form of decoction—half an ounce of it being boiled in a pint of water down to half a pint, which quantity is to be taken daily. It appears to promote the secretions and excretions.

72. *Various other active Medicines* have been employed with the view of removing the fit. Some of these are extremely powerful, and require much caution; others have little influence. The *Rhododendron chrysanthum* has been prescribed by HOFFMANN, KOELPIN, BUZOW, PALLAS, WEISMANTEL, and METTERNICH. It is used principally in the northern countries of Europe; and, when carefully exhibited, is a medicine of no mean efficacy, especially in the more chronic states of the disease. The decoction of *Solanum dulcamara* has been recommended by CARRÈRE, WANTER, and PRESSAVIN; the decoction of the *Sambucus*, by FREITAG, BLOCHWITZ, and GARDANE; the *Erigeron Philadelphicum*, by BARTON; *Digitalis*, by HOFFMANN and GÄPPER; the decoction of the *Ilex aquifolium*, by FRIZE, REIL, DREYSIG, and BANDELOW; and the decoction of the *Hedera terrestris*, by De HEIDE and CARTHEUSER. Of these, the *sambucus* seems most deserving of use, the berries and bark being the most active parts.

73. The above substances act energetically upon the digestive mucous surface, and promote the secretions and excretions; but, when exhibited in large doses, they also inflame this surface, impair the organic nervous energy, powerfully affect the brain and the rest of the cerebro-spinal system, and lower the sensibility. They should, therefore, be given with great discrimination and caution. Where the powers of the constitution are materially weakened, and the organs of digestion in a state of irritation, they ought not to be employed. Their influence on the paroxysm is chiefly to be attributed to the above modes of operation—to the copious evacuations they procure from both the liver and digestive mucous surface—and partly to their action on the nervous system.

74. b. The *Portland gout powder* once had great reputation for preventing the return of the fit. It consists of the roots of birthwort, and of gentian, and of the tops and leaves of germander, ground-pine, and centaury. These are well dried, powdered, and sifted, and mixed together in equal weights; a drachm being taken every morning fasting. Dr. CLEPHANE has instituted a learned inquiry into the origin and use of this powder. Having continued this quantity for three months, a dose of three fourths of a drachm is given for another three months, and half a drachm afterwards for six months. This medicine differs but little from some mentioned by GALEN, CÆLIUS AURELIANUS, AETIUS, and others of the ancients; and which appear to have been brought into notice for a time, and then to have fallen into neglect, owing to their pernicious influence. Indeed, CÆLIUS AURELIANUS remarks, that he has seen gouty persons, who frequently used bitters, carried off by apoplexy; and the same remark is made by BOERHAAVE and QUARIN. Dr. CULLEN states, that where the Portland powder has been long used, the external manifestation of gout was not ob-

served; but symptoms of atonic gout, or apoplexy, or asthma, or dropsy, supervened. He remarks, that the prevention of the disease depends much on supporting the tone of the stomach, and avoiding indigestion; that costiveness, by occasioning this latter, is hurtful and should be avoided; and that much purging is injurious.—The aperients he recommends are, aloes, rhubarb, magnesia, and precipitated sulphur, as they may suit particular cases.—Sulphur is recommended for the prevention of the fit by TULPIUS, RULAND, GRANT, GARDINER, and QUARIN. HUFELAND advises it to be conjoined with guaiacum, in a quantity sufficient to act moderately on the bowels. There is no doubt of sulphur and magnesia being both safe and efficacious, in preventing the return of the disease, when aided by suitable diet and regimen.

75. *c. Chalybeates* have been considered as extremely efficacious in preventing the fit, especially when conjoined with the alkaline subcarbonates, and when the bowels are kept open during their use. The preparations of hop are also of service; but they require, equally with chalybeates, quinine, and other tonics, an abstemious and temperate diet, and exercise in the open air. Of tonic, stimulating, and heating medicines, given with the view of preventing the paroxysm, it may be stated, that they are dangerous in the plethoric and robust, inasmuch as they increase vascular fulness and action; and that, if they be resorted to, in such persons especially, abstinence, and the free action of all the emunctories, should be observed. In some cases—particularly in nervous, irritable, and delicate constitutions—a moderate quantity of wine, or either of the tonics in most common use, as the preparations of cinchona, or of the aromatic or bitter substances, or of iron, or of hop, &c., is almost indispensable; but the use of purgatives and the rest of the treatment should also be enforced.

76. *ii. Treatment of Chronic Gout.*—This state of disease has been shown to occur either primarily, or consecutively on the acute.—*A. In the former case*, the powers of the constitution are insufficient to produce the disease in a sthenic form; and either the nervous, or the lymphatic, or phlegmatic temperament, is generally predominant. The indications of cure should be founded upon a careful estimate of the condition of the several functions, especially those concerned in excretion. Vascular plethora is seldom present in such a degree as to require general depletion. The imperfect performance of the digestive, assimilating, and excreting functions, and defective nervous power, indicate the employment of medicines calculated to increase these functions. When the biliary secretions are scanty or obstructed, a full dose of calomel, of camphor, or JAMES'S powder, and hyoscyamus, may be given at bed-time, and a purgative draught at an early hour in the morning. To these may be added, during the day, saline, aperient, and diuretic medicines, with an alkali, or magnesia. It will frequently be necessary to soothe nervous irritation by the exhibition of a narcotic. The preparations of opium, especially DOWSE'S powder, or morphine conjoined with camphor or aromatics, will generally give relief, especially after morbid secretions and excrementitious matters are evacuated. But they constipate the bowels; the other narcotics may

therefore be tried. It will, however, be found frequently preferable to continue the opiate, and to obviate its effects by one of the stomachic aperients prescribed above, taken early each morning.

77. Tonics, and heating or stimulating medicines, tend rather to fix than to remove the disease; and are always injurious, if excrementitious matters have not been carried off. An alterative and aperient pill, as the hydrargyrum cum creta, Castile soap, and extract of taraxacum; or PLUMMER'S pill, with either of the same adjuncts; may be taken at bed-time, and a small or moderate dose of any of the preparations of colchicum in the morning and at mid-day, with any of the stomachic aperients as prescribed above (§50. 68.).—In this form of the disease especially, the spiritus colchici ammoniatus is a useful medicine. But either of the other preparations may be used, conjoined with magnesia, or with any of the alkaline subcarbonates, and with saline or stomachic aperients. Sir C. SCUDAMORE recommends a draught with compound tincture of benzoin and magnesia to be given once or twice a day, or the compound decoction of aloes, with an equal proportion of the infusion of cascarrilla or of gentian. When the secretions are restored to a healthy state, and debility of stomach with general depression is the principal ailment, gentle tonics, aided by suitable diet, and moderate exercise in the open air, are necessary; but a too full and stimulating diet, or heating regimen, should be avoided. In the summer and autumn, the warm sea bath, twice or thrice a week, will be serviceable.

78. *B. Chronic gout consequent upon the acute*, especially after repeated invasions of the latter have impaired the constitutional powers, is generally attended by obstinate disorder of the digestive and excreting functions, with more or less disturbance of the nervous system. Vascular plethora is oftener present in this variety of chronic gout, than in the preceding; and the local affection is readily increased by the internal use of stimulants; but alterative aperients, conjoined with colchicum and diuretics, as just recommended (§77.), will generally be efficacious. When the bowels are very torpid, the purgatives mentioned above (§50. 54. 56.) should be given in such doses as may be sufficient. Sir C. SCUDAMORE advises the addition of guaiacum to the purgative in such cases; and, when little or no fever is present, it will prove beneficial. If congestion exist in the liver, head, or kidneys, cupping will be necessary. When pain in the stomach, or tenderness in the epigastrium, is complained of, leeches applied on this region, and followed by a rubefacient epithem, or blister, will be requisite. If the urine be scanty, high-coloured, and thick, cupping over the kidneys, and the use of active diuretics, will be of great service. Besides the saline substances already noticed, small doses of turpentine, or a decoction or infusion of the pine sprouts or tops, as directed by BARTHEZ, may be given at short intervals; or the preparations of juniper, or the sweet spirits of nitre, may be added to saline and alkaline medicines. When the liver continues torpid, or the bile deficient, and the urine thick, the compound calomel pill, with soap, should be given at night, and the extract of taraxacum added to the medicine prescribed during the day.

79. Having removed the more urgent phenomena, the treatment should be directed to the restoration of the healthy actions of the emunctories, and of the digestive organs, as insisted on with reference to the other states of the disease.—But unless an abstemious diet and temperate regimen be observed, and be aided by regular exercise in the open air, disorder of these organs will soon return, and the gouty affection afterwards reappear.—When the nervous system has become very susceptible, and the parts affected more or less changed in structure, the object, after the removal of the internal disorder, is to invigorate the nervous system, and restore the parts as far as possible to the healthy state. Unless this end be accomplished, so as to allow the patient to take sufficient exercise, recurrence of the disease can hardly be prevented; and, although the digestive and excreting functions may be preserved in a healthy state, the affection will assume more or less of a rheumatic character; or rheumatism will be associated with it; and the patient will be injuriously impressed by every change of weather, and by every exposure. Where this state of disorder occurs, small doses of DOVEN'S powder, either alone or with camphor, and a judicious recourse to aperients with tonics, will prove beneficial. Sulphur, either alone or with guaiacum, as recommended by HUFELAND; and the compound decoction of sarsaparilla, with the *liquor potassæ*, or with *hydriodate of potash*, or with both, aided by the external applications about to be mentioned, will also be serviceable in these cases.

80. C. The local treatment in chronic gout should claim attention as soon as the more urgent disorder subsides.—a. The vapour bath frequently increases the weakness of the parts; but sponging the surface with a strong tepid solution of salt in water, is often of service.—Frictions with slightly stimulating liniments, as the compound camphor, and compound soap, liniments conjoined, are generally beneficial; and to these may be added, in the more indolent cases, spirits of turpentine and cajuput oil. Frequent or continued frictions are of the greatest benefit, and should be employed in the intervals between the use of liniments. When oedema remains, and the sensibility of the parts has subsided, the tincture of *iodine* may be applied over the surface with a camel-hair pencil.—Electricity, especially sparks drawn from the part, has been advised in such cases by QUELMALZ, NEIFELD, SCHAEFFER, BAUMER, DE HAEN, VOGEL, and SIGAUD LA FOND; and *galvanism*, by WALTHER and BISCHOFF. Of the efficacy of these, however, I can give no opinion. Suitable support of the parts by bandages, or by laced stockings, is generally of service. Of the use of mineral baths, &c., mention will be made in the sequel. But whatever external means are employed, ought to be preceded and accompanied by internal treatment, otherwise little permanent advantage will accrue; or even the external affection may be thereby merely suppressed, and internal disease either produced or increased.

81. b. The gouty concretions are seldom removed even by the aid of external treatment. Mr. MOORE states, that pressure ought not to be applied to them; and that their removal by the knife should not be attempted. He, however, admits that a small puncture of the cuticle may be

made, and that caustic may be applied when they have penetrated the cutis. The application of cajuput oil was recommended by HUFELAND and ABRAHAMSON; but it is more advantageously used with the spirits of turpentine and the compound soap liniment. J. P. FRANK advises soaps rendered emollient in almond or other oils, with the addition of camphor. Sir C. SCUDAMORE directs the liquor potassæ, diluted by an equal quantity of almond milk, to be rubbed over the part twice or thrice daily; and calcined magnesia and liquor potassæ to be given internally in almond emulsion, or in any other vehicle suggested by the state of the internal functions. It is necessary, however, that this plan should be persevered in, and that the functions of the stomach and liver should receive strict attention. Regular exercise in the open air ought also to be taken, as advised by SYDENHAM, and found beneficial in his own case.

82. iii. *Treatment of Irregular Gout.*—I have shown above, that gouty affections may be irregular in three different ways.—(a) The precursory disorder may be of an irregular, prolonged, or unusual character, and ultimately be followed by the external affection;—(b) or the disease may commence in its usual manner, suddenly disappear, and affect some internal viscus;—(c) or it may seize at once upon some internal organ, and either exhaust itself, or be remedied by treatment without any external affection appearing in its course, or it may destroy the patient.—The first and third of these varieties require the same treatment, modified according to the character and seat of the internal affection. I shall therefore consider, in the first place, the means most appropriate to the disorders connected with the retrocession or suppression of the external affection.

83. A. *Retrocedent Gout.*—In no disease is discrimination, on the part of the physician, more necessary than in this; for upon the inference that is formed as to the existence of inflammation or of spasm, and as to the degree in which either is present, the life of the patient depends.—a. In nervous and weak constitutions, a *spasmodic* or *nervous* character is generally predominant, as indicated by the weak, or irregular, or unaccelerated pulse, and by the ease derived from pressure, &c. In these, energetic stimulants or antispasmodics, with anodynes or narcotics, or even warm brandy and water, are required. In other cases, a mixed affection, or a state of congestion, may be inferred; and in them, the remedies just mentioned may not be injurious, but additional means are required, especially alvine evacuations, external derivatives, or even local depletions. When the retrocession appears to have been caused by indigestible matters, an emetic should be exhibited, conjoined with a warm cardiac, as capsicum, ammonia, or camphor; and if nausea and vomiting be present, a full operation should be procured by warm water, or by the infusion of chamomile flowers. If the stomach or bowels are principally affected, a full dose of calomel, with camphor, hyoscyamus, or opium, should be given; and, two or three hours afterwards, one of the purgative draughts already prescribed, which should be aided in its operation by a cathartic enema containing turpentine, assafoetida, or camphor.—If suffering

still continue, the calomel, camphor, and opium may be repeated, after an interval short in proportion to the severity of the case; the feet should be plunged in hot water to which a large quantity of mustard flour and salt are added, or be enveloped in sinapisms; and flannels wrung out of very hot water, and soaked with spirits of turpentine, should be applied over the abdomen; or croton oil rubbed over the stomach. Sir C. SCUDAMORE directs the saline draught with colchicum to be given and repeated; but I doubt the propriety of giving this medicine in cases of consecutive gouty affection of the stomach or intestines.

84. *b.* Although the internal affection will often assume a nervous or spasmodic character—especially in the constitutions mentioned in connection with it, and at the commencement of the seizure, before vascular reaction has taken place—yet *active congestion or inflammatory determination* is not infrequent, particularly in more plethoric and irritable habits.—Much care and discrimination are required to ascertain the presence or absence of these states; and either is to be inferred chiefly from the causes of retrocession, from the state of the pulse and of vascular repletion, and from the tenderness, fulness, or tension, and temperature, of the regions containing the affected organ. The patient's sensations, and the symptoms connected with the excreting functions, ought also to be carefully estimated. If, from these, *inflammatory action* of the stomach, intestines or kidneys be inferred, bloodletting, according to the strength and habit of body of the patient, must be promptly put in practice. But vascular depletions are neither so well borne in such cases, nor so successful, as for inflammations occurring primarily, or in previously healthy persons. The amount and repetition of depletion must depend entirely upon the circumstances of the case; but, in every instance, depletion should be aided by the derivatives and hot epithems just recommended. A full dose of calomel, with a few grains of camphor, and two of opium, should also be administered, and repeated within two or three hours, if indications of relief are not observed. After one general bloodletting, local depletion by cupping or leeches may be employed, and repeated in severe cases, or in plethoric persons. In some instances, the powers of the circulation can bear only local depletions.—When much flatulent distension, and severe colicky pains, either attend the internal seizure, or remain after the above means are employed, equal parts of oil and turpentine and of castor oil (3iv. to 3vj. of each) may be given on the surface of an aromatic water, with or without a warm tincture, or aromatic spirit; and an enema containing the same oil may be administered a few hours afterwards, to promote its operation.

85. *c.* The internal attack, although nervous or spasmodic at its commencement, may become congestive, or even inflammatory, as vascular reaction supervenes. This fact should not be overlooked; for the seizure that is benefited by stimulants at the beginning, owing to this circumstance, may require depletions in its progress. The internal affection may even present a *mixed character*—one in which it is difficult to determine whether the nervous, or the spasmodic, or the congestive, or the inflammatory symptoms predominate. In these cases, it will be necessary

to have recourse to antispasmodics and narcotics or anodynes, whilst vascular depletions and evacuations are being employed.—Having treated several cases of retrocedent gout, and being thereby induced to observe closely, and to reflect upon, the phenomena attending it, and the effects of the treatment adopted, I am morally convinced, that exclusive views as to either the nervous or the inflammatory character of the internal affections, are incorrect; and that it requires the utmost acumen on the part of the practitioner to discriminate between these states, and to detect their varying shades. In the more spasmodic forms of these affections, especially when implicating the stomach, opium and camphor are most valuable remedies; but I have seen great benefit also accrue from hydrocyanic acid given in repeated doses with camphor and aromatics.

86. *d.* When the consecutive seizure is experienced in the *heart or lungs*, the same principle of practice should be observed. When the *heart* is affected, the restlessness, anxiety at the præcordia, and alarm of the patient, are most distressing. I have lately seen two cases of this kind. In both, the action of this organ was frequent, irregular, fluttering and weak; in one, it intermitted every fourth beat, the three intervening strokes being successively weaker. In both these I am convinced, from the character of the symptoms, that depletions would have caused a fatal result. Camphor and opium, with aromatics and external derivatives, were prescribed for both, and in a few hours the affection was removed. In the cases also referred to above (§ 19.), this and similar modes of practice were equally beneficial.

87. *e.* When *apoplectic, epileptic, or convulsive* seizures follow the retrocession of gout, vascular depletion is frequently requisite, especially in apoplexy. But, even in it, discrimination is imperatively called for. If the head be cool, and the action of the carotids weak, an entirely opposite treatment to depletion is required.—In the *epileptic or convulsive seizures*, depletions are often unnecessary, and sometimes injurious. Even when manifestly indicated, they require much caution, and ought not to be prescribed in large quantity. In both the apoplectic and epileptic attacks, *purgatives*, and cathartic enemata, energetic derivation to the lower extremities, and camphor, are beneficial; but narcotics should be withheld, especially in the former, although, when conjoined with antispasmodics and cardiaca, they are sometimes of service.—When the retrocession of gout has been caused by cold, vascular depletion is more frequently useful, than in other circumstances; but the utmost caution is necessary as to the extent to which it is carried. Derivations by sinapisms, mustard pediluvia, croton oil, &c., however, ought to be most actively employed.

88. *f.* If the *kidneys* or neck of the *bladder* are affected upon the retrocession of gout, the treatment will depend entirely upon the concomitant phenomena. If the urine be suppressed, or pain or tenderness be felt in the region of the kidneys, or numbness in one or both thighs, cupping on the loins, followed by a blister in the same situation, will be requisite; but the latter should be removed after a few hours, or sinapisms substituted.—Derivation to the lower extremities, and small doses of camphor internally, with diuretics,

ought also to be prescribed.—When the neck of the bladder becomes affected, leeches applied to the perineum, the semicupium, and the internal use of alkalies, with camphor and anodynes, or with mucilaginous and diuretic medicines, should be employed.

89. *B. Misplaced Gout* (§ 21.), or those severe affections of internal organs which threaten the life of the patient, and are either followed by the regular disease, or run their course without any external affection, although occurring in persons who have previously had gout, must be treated very nearly according to the principles stated above. If vascular depletion require cautious discrimination in retrocedent gout, it still more imperiously demands it in cases of this kind.—*a.* Any internal organ may be the seat of misplaced gout, or in other words, the internal viscera are disposed to severe disorder in gouty constitutions; but the stomach, bowels, heart, brain, and kidneys are most frequently affected. Gouty persons are often affected by spasms of the stomach and colic, after exposure to cold, or after partaking of cold, acid, or improper food. For these cases, large draughts of warm water, and stimulant and cardiac medicines, or warm brandy and water, are suitable means. In some, the disorder alternates between the *stomach* and *heart*; or the flatulence attending upon the affection of the former, induces palpitation or otherwise disordered action of the latter, with inexpressible anxiety. A gentleman who had suffered attacks of gout, but had escaped them for some years, was subject to disorder of the stomach, to severe headaches, and to alarming and sudden affections of the heart, the action of which was fluttering or tumultuous; and the anxiety and suffering referable to it, most distressing. He was lately seized with one of these attacks at a party. He was assisted into his carriage, and was brought to my house after midnight. The affection approached the characters of angina pectoris, but I inferred its aggravation by flatulence: I therefore prescribed a warm carminative medicine. Whilst this was being procured, I directed the patient to swallow a few of the small pods of capsicum. Flatulent eructations and instant relief were the consequences. In a few minutes afterwards he walked unaided to his carriage.

90. A gentleman well known in the profession had some years ago experienced imperfect manifestations of gout in the lower extremities, connected with affection of the digestive organs. Recently after a severe domestic affliction, he was seized with distressing disorder of the stomach and heart, with anxiety, alarm, and nervous irritation. Dr. Roors and myself agreed as to its nature; and prescribed anodynes with antispasmodics, aromatics, and alkaline subcarbonates. The excretions received due attention, and external derivatives (§ 83.) were employed. Whilst improving under this treatment, he was suddenly affected by an alarming increase of the disorder of the heart. His pulse had become weak, irritable, and intermitting; the impulse of the heart was feeble, but unaccompanied by any abnormal sound; his countenance was expressive of distress; and he was constantly changing his position. A draught, containing two drops of hydrocyanic acid with camphor, aromatics, and capsicum, was prescribed, and repeated in an hour.

and derivations by sinapisms resorted to. He obtained relief in a few hours, and continued improving for two or three weeks afterwards; when he had a second attack in the night, for which camphor and ammonia, with opium, were given him, and carminatives with magnesia. He was immediately relieved, and has continued afterwards to improve; the subsequent treatment consisting of a combination of anodynes and restoratives, and of stomachic aperients.

91. *b.* When apopleptic or epileptic seizures, or diseases of the kidneys or bladder, thus occur in persons who have previously had fits of gout, the treatment should be guided according to the principles just developed.—*Apoplectic* and *paralytic attacks* are very common in gouty persons far advanced in life, and who have been long without a regular paroxysm. In these, depletions are not so generally beneficial as in other circumstances, although they are often required; the energetic exhibition of purgatives and of cathartic enemata, and the application of sinapisms to the feet, &c., being much more generally appropriate.—When *epilepsy* or *convulsions* appear in gouty persons, depletions are hazardous; antispasmodic and purgative enemata and derivation being much more useful. Whatever organ becomes diseased in such persons, the treatment must be guided by the state of the pulse, the signs indicating the nature of the complaint, and the age and strength of the patient; for although large depletions may be necessary in some cases, yet they will certainly destroy the patients in others, although the disorder and its seat are apparently the same. When the disease presents unequivocally inflammatory characters, or when the patient has been highly fed, or is plethoric and robust, bloodletting cannot be dispensed with; the question being, as to the extent to which it should be carried; and, as to this, the practitioner must decide for himself, and be guided by the peculiarities of the case. In the gouty constitution especially, it cannot be trusted to alone, or even principally, unless in robust and plethoric persons.—When apoplexy is complicated with gout, the former occurring during the paroxysm, or without the disappearance of the latter, bloodletting and alvine evacuations should be prescribed with an energy suitable to the circumstances just adverted to. Such cases are, however, comparatively rare.—I have never known of an instance of epilepsy whilst the gouty paroxysm continued, although I have seen it take place upon the retrocession of the fit, and in gouty persons. VAN SWIETEN remarks, that, in cases in which he has seen an epileptic seizure in the gouty, the occurrence of a regular paroxysm of gout has prevented a return of the epilepsy.

92. *c.* As to the employment of *colchicum* in cases of retrocedent or misplaced gout, recent writers have stated nothing in which the practitioner can confide. When the stomach is weak, the nervous power depressed, and the pulse irritable, it is generally injurious: when inflammatory seizures occur, either upon the sudden disappearance of the external affection, or in the gouty constitution, it may be employed: and the advantage proceeding from it will be in proportion to the degree of sthenic action indicated by the pulse. Yet cases will sometimes occur, in which this medicine cannot be endured, although indi-

cations of vascular fulness and of increased action are present. A gentleman of regular habits, and of a full and large make, had the consequences of chronic gout in his lower extremities, but had not experienced a regular paroxysm for some years. My attendance was required on account of determination of blood to the head. The excretions were fecie, bilious, and natural. Desirous of removing the disorder by active alvine evacuations, I conjoined small doses of colchicum with the purgatives; but they occasioned a distressing sense of sinking at the epigastrium, and nausea. I soon afterwards found that depletion could not be dispensed with; and nearly thirty ounces of blood were taken from the nape by cupping, without any tendency to syncope; and he soon recovered.—In all cases of doubt, this medicine should be prescribed in small doses, which may be increased; but, as with digitalis, an accumulating effect may result; and it ought to be carefully watched. When, however, increased vascular action exists, in the irregular forms of the disease, it may be cautiously used.

93. Dr. BARLOW remarks, “that the complex conditions and alleged varieties of gout are referrible not intrinsically to gout, but to the state of constitution in which it occurs.” This is all that is meant; for no modern pathologist intends to convey any other idea than that internal affections supervening in that state of constitution which occasions gout, are generally more or less modified by this circumstance. It is to the improvement of this state of constitution, that treatment should be directed; and, after arriving at rational inferences as to its nature, the means of cure will readily suggest themselves.—Having seen that the constitution or diathesis, which has been called gouty, in order to prevent circumlocution, consists in debility associated with imperfect secretion and excretion, and consequently with fulness of blood or with redundancy of excrementitious matters—the ultimate products of assimilation in the circulation—the treatment should obviously be directed with reference to the predominance of either of these states. Although what has generally been called misplaced gout, may thus be viewed as internal affections occurring in the gouty diathesis, and although they sometimes present little deviation from those appearing in other circumstances, yet a very remarkable difference is often observed—the symptoms being very different, and often peculiar, and the juvenia and lardentia being also different.—The predominance of debility and spasm in many of these affections induced SPRENGEL, CULLEN, and SCHWIDTMANN to prescribe *musk* for them; and the success of the treatment is a presumption of the justness of their views, at least in respect of the cases in which it was employed.—In addition to other stimulants and antispasmodics successfully resorted to in similar circumstances, most of which have been noticed above, I may state, that a solution of *phosphorus* in ether has been advised by TRAMPF and HUFELAND; *aconitum* and *nux vomica*, by STORCK, myself, and others; the spirits of *turpentine*, by THEODOSIUS and GOOD; and large doses of *olive oil*, by BREPOLD, MARINO, and MALACARNE. If turpentine, however, be resorted to, castor or olive oil should be given with it, in a quantity sufficient to produce a full operation on the bowels; and

the same combination ought to be administered as an enema, in order to promote this effect. Neither of these substances, however, nor camphor, ammonia, ether, opium, nor any of the other stimulants and antispasmodics previously mentioned, should be confided in alone, or unaided by active and persevering external derivation.

94. iv. Of Mineral and Thermal Waters in Gout.

—Mineral waters are beneficial—1st, by preventing a return of the paroxysm; 2dly, in cases of a tonic and misplaced gout, by giving tone to the digestive and assimilating functions, and thereby either removing the internal affection, or enabling the system to develop the disease in the extremities.—a. Respecting the *Bath waters*, Dr. BARLOW makes several very judicious observations. In gouty cases, he remarks, especially where the stomach is very weak, and requires some substitute for the wine and stimulants relinquished, the Bath waters give tone to the stomach, improve appetite, and renovate strength. They thus accomplish unequivocal good, not by the mere establishment of gout in the extremities, but by reducing it to its simpler and more manageable state through the amendment effected in the general health. In general, it may be inferred, from what has been written on Bath waters in gout by FAICOMER, GIBBS, BARLOW, and SCUDAMORE, that they are either injurious or of little service, where plethora, disease of the liver, or determination to the head exists, and that these states should be removed before they are resorted to; but that they are of service in debilitated, nervous, and irritable habits; and for those anomalous or internal affections frequently attacking gouty constitutions. When these affections occur in weak and nervous persons, and are unconnected with plethora, or active visceral disease, the internal and external uses of these waters are beneficial, especially if due attention be paid to the excreting functions.—When gout has debilitated the limbs, and weakened the constitution, so that the nervous system is depressed, and the circulation languid, a course of warm sea-bathing, with frictions of the weakened limbs, and sea air, may be tried, or may precede the use of the waters of Bath or Buxton.—Where swellings are seated in the vicinity of the joints, the Buxton baths, or pumping of the Buxton waters on the affected parts, are generally serviceable, especially if proper friction and shampooing be used immediately afterwards.—b. Sir C. SCUDAMORE observes that the waters of *Cheltenham* prove highly beneficial to gouty persons, particularly when conjoined with alteratives and proper regimen. When the precursory symptoms are tedious, or assume the form of what is usually called misplaced gout, their stimulating properties often excite a paroxysm, but it is generally slight. The water No. 4. seems most suitable to gouty patients, especially at the commencement of a course of these waters.

c. The waters of *Leamington* and *Harrogate* are not much inferior to those of Cheltenham, when they act sufficiently on the bowels, or when their operation is aided by aperients. They seem, however, in the circumstances just alluded to, to have considerable influence in exciting a fit of the disease.

95. d. The artificial mineral waters at Brighton, especially the *Seidschutz*, the *Marinebad*, the *Em*, and *Carlsbad* waters, may also be employed

in the more chronic or misplaced states of the disease.—The waters of *Wiesbaden* are much used, both internally and externally, in atonic or misplaced gout, as well as others of the *Nassau* springs; but they are not superior to the mineral waters of our own country.—*e. PISO*, *ZECCHIUS*, *BAGLIVI*, and *SAUNDERS* consider the warm mineral waters recommended in gout as little superior to common pump water heated to the same temperature. They advise from half a pint to a pint of common water, of a temperature from 90° to 114°, to be taken, and succeeded by moderate exercise every morning before breakfast. *Dr. SAUNDERS* states that, in anomalous gout, it allays the irritation of the stomach, and diffuses a generous warmth in the extremities; and that, if taken at night, it conduces to sleep.

96. v. The *Prevention of Gout* consists chiefly in the careful avoidance of the predisposing and exciting causes, and of acidity of the *prima via*. An abstemious diet, and a small quantity of animal food, are requisite. Some writers, as *STARK*, *REDI*, and *LOBB*, recommend the adoption of vegetable food only; but this restriction is not necessary. Temperance is equally important: unless it be strictly observed, no other means of prevention will be permanently of service. Regular exercise on foot, or on horseback, so as to promote the excretions, is likewise beneficial. Moderation of all the passions and affections of the mind, and avoidance of too intense or prolonged mental application, have been insisted on by most writers; the latter especially by *SYDENHAM* and *GOOD*. If abstinence, however, be adhered to, and moderate exercise be taken, mental application is seldom injurious.—Flannel clothing next the skin, by promoting the excreting function of this surface, is very serviceable. All vicissitudes of temperature, and exposure to cold, wet, humidity, or changeable weather, ought to be avoided. The feet should be kept dry and warm; and, with the legs and knees, be sponged every morning, as advised by *Sir C. SCUDAMORE*, with a strong solution of salt in water, of a tepid or slightly warm temperature. If the limbs be weak, pained, or the parts thickened, frictions may be afterwards used. *DESSAULT* directs the limbs to be well rubbed night and morning with the hands covered with strong worsted gloves, and states, that a man at seventy had gout; was cured, and remained free from it ever after, owing to this practice, although he lived to 100 years. *Sir W. TEMPLE* says, that no man need have gout, who can keep a slave to rub him. Cold bathing is hazardous for gouty persons, unless active frictions be employed immediately afterwards; but tepid or warm salt-water bathing is useful. Of the kind of food most serviceable in gouty cases, little further need be stated, than that the easiest digested is the best. Rich dishes and sauces, acids and pickles, pastry, heavy puddings, much butter, and the richer kinds of fish, as salmon, &c., should be shunned.

97. The medical means of prevention have already been noticed (§ 67.). They consist chiefly of medicines calculated to promote the secretions and excretions, and restore nervous energy. Means producing this latter effect only are injurious if they be not conjoined, or alternated, with those causing the former.—*Magnesia* has been much employed as a prophylactic, and

is amongst the medicines that can be employed, either alone or with rhubarb. Its daily use has been dreaded, since *Mr. BRANDE* published the accounts of two cases, in which it formed concretions with the mucus of the intestines. But this occurrence is very rare; and, if more active purgatives be occasionally employed, not likely to occur. Lime water and the alkalies have also been prescribed as prophylactics; but the alkalies, when continued long, weaken the stomach and relax the digestive mucous surface. The use of a dinner pill such as I have directed above (§ 68.), or prescribed in the *Appendix* (F. 562.), is more safe, and is generally beneficial.

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GRAVEL. See URINE, &c.

HÆMORRHAGE.—SYN. Αἱμορραγία (from αἷμα, blood, and ῥήνυμι, I break forth), Αἱμορροία (from αἷμα, and ῥέω, I flow), Gr.—Sanguinis Profluvium, Sanguifluxus, Auct. Latin. Hæmorrhagia, Sauvages, Cullen, &c. Hæmorrhæa, Swediaur, &c. Cauma Hæmorrhagicum, Young, Profusio, Linnæus. Hæmorrhagie, Flux de Sang, Fr. Das Bluten, Blutfluss, Germ. Emorragie, Flusso di Sangue, Ital. Hæmorrhagy, Bleeding.

CLASSIF.—1. Class, Febrile Diseases; 4. Order, Hæmorrhages (Cullen). 3. Class, Sanguineous Diseases; 4. Order, Cachexies (Good). 11. CLASS, III. ORDER (Author, in Preface).

1. DEFIN.—The discharge or escape of blood from the vessels or channels in which it circulates in the healthy state of the body.

2. Hæmorrhage may take place from the heart, the arteries, the capillaries, or veins, in consequence of disease or of external injury. It may proceed from the capillaries without any obvious lesion, excepting an almost inappreciable dilatation of them; or from the vessels formed in adventitious productions, as from fungoid, carcinomatous, and erectile tumours. It is more or less intimately connected with, and even dependent upon, the state of vital power and of vascular action, and upon local or general plethora, especially when proceeding from capillary vessels.

3. Although the definition given above comprises all the various kinds of hæmorrhage, yet I will confine myself to the consideration of those states of it which fall more especially under the cognisance of the physician. Whenever the red particles of the blood escape from the vessels to any very evident amount, hæmorrhage may be said to exist: and this inference is admissible in whatever situation the extravasation takes place—whether on mucous or serous surfaces, in the parenchyma of organs, or in any of the compound structures of the frame. All parts of the body may become the seats of hæmorrhage, excepting those which are extremely dense, as the bones, cartilages, ligaments, tendons, &c.

4. Although hæmorrhage may take place from any part of the circulating system in consequence of injury or of disease, yet it oftenest proceeds from the minute vessels distributed in mucous or serous membranes, or in the parenchyma of organs, as an exhalation or exudation from their extremities or pores. Before the time of MORGAGNI, as M. CHOMEL has remarked, it was ascribed to the rupture of a blood-vessel; and the same doctrine was very generally received until BICHAT and LAENNEC confirmed the views of this celebrated pathologist. Cases, however, often are met with, in which it is very difficult to determine whether the hæmorrhage proceeds from exhalation or from a ruptured or diseased vessel; and, even on inspection after death, the most intimate examination is requisite to the ascertaining of its source.

5. The discharge of blood from capillary vessels, in the form of exhalation or exudation, has been very generally viewed as depending upon a state of those vessels different from that which constitutes inflammation. This doctrine has been recently controverted, particularly by LEBEREAU and BROUSSAIS; and the following points, in which hæmorrhage closely resembles inflamma-

tion, have been adduced in proof of their very intimate connection, if not of their identity: they both very frequently arise from the same predisposing and exciting causes; both are idiopathic or primary, and symptomatic or consecutive; both are either æsthenic or asthenic, acute or chronic, active or passive; they both affect chiefly the same organs; and both require the same treatment. Notwithstanding these resemblances, hæmorrhage is far from being the same disease as inflammation, as will appear in the sequel (§ 13. 15.).

6. In a great majority of instances, hæmorrhage is merely a symptom, contingent upon a variety of affections, the primary ailment being chiefly important to the physician. This is the case, no less when it takes place as an exhalation from mucous surfaces, as when it occurs from disease of the vessels, or into serous cavities, or the parenchyma of organs.—If we enter into an analysis of the pathological relations of hæmorrhages, we shall find that, in comparatively few cases, are they strictly primary or *idiopathic*. This term, therefore, must have a relative acceptance as regards them. Even when proceeding from the capillaries of mucous surfaces, and when perfectly independent of organic lesion of the vessels or of that surface, hæmorrhage is a consequence of antecedent changes; and it is indispensable to the due consideration of the subject, that the nature of these changes should be understood. They may be referred to four general heads; namely—1st. To the states of organic nervous power and vital action;—2d. To the state of structure in which the hæmorrhage takes place;—3d. To the state of the circulating organs and vessels;—4th. To the conditions of the blood;—and, 5th. To any two or more of these conjoined.

7. i. *Of the States of Organic Nervous Power, or Tone, and of Vascular Action, in Hæmorrhages.*—Although nervous power may be either excited or depressed in the seat of hæmorrhage, it is rarely the former, even when vascular action is increased, unless an irregular distribution or determination of it to the part take place, from its suppression in some other situation, or from local irritation. Vascular action, however, is much more frequently increased than depressed, not only in the part, but throughout the system; and this increase is generally much above the state of organic nervous power or tone. Owing to this circumstance—to the deficient tone of the extreme vessels, and to the imperfect resistance opposed by them to the increased action of the heart—is to be attributed, in part, the occurrence of hæmorrhage; or, in other words, vascular action overcomes the resistance opposed to it by the vital tone of the capillaries of the part in which hæmorrhage takes place. The frequent increase of action in this class of diseases induced Dr. Cullen to arrange them amongst febrile complaints. But this increase is not general; and, even when it exists, it is often consecutive upon, or produced by, the sanguineous discharge.—When hæmorrhages are accompanied by excited action, the vascular excitement is frequently manifested chiefly in the parts affected, and in those adjoining them, in the form of active determination or congestion. Thus, in epistaxis, hæmoptysis, hæmatemesis, hæmorrhoids, &c.,

there is excited action in, or determination to, the organs or structures in the vicinity of the surface from which the blood is discharged, although the circulation in other parts of the frame may be natural, or even below the usual standard. This circumstance, in connection with the antecedent and concomitant phenomena of hæmorrhages, indicates an irregular distribution of vital action, generally attended by deficient organic nervous power or tone—an increase of vascular action in certain parts, and a diminution of it in others, rather than a state of general febrile commotion. In many instances, also, more especially in the symptomatic varieties, the extravasation is unaccompanied by increased action, and, as we shall see hereafter, is more frequently the result either of a morbid condition of the textures, or of the vessels themselves, or of impeded return of the blood, in connection frequently with plethora, local or general, and with other morbid states about to be noticed.

8. Whilst, however, we observe, thus frequently, an irregular distribution of vital action through the frame, the increased action, when increase exists, being in the seat and vicinity of hæmorrhage, it must be admitted that febrile commotion also sometimes exists and ushers in the sanguineous discharge. It would seem as if, in many of these cases, the febrile excitement accidentally produced, had given rise, owing to the increase of the *vis à tergo*, to the extravasation; the impaired tone of the extreme vessels being insufficient to antagonise the action of the heart.

9. In many cases, the hæmorrhage is altogether the result of irritation, particularly when applied to a mucous surface; but, in these, the sanguineous discharge is very slight, or is merely a part of the evacuation that takes place. Here the extreme vessels become enlarged or dilated, owing to that state of vital expansion which mucous and erectile tissues assume when subjected to irritants or stimuli. From the expansion thus induced, an increased momentum of blood in the enlarged capillaries, and the determination of the circulating fluid to this quarter, necessarily result. If we apply any irritating substance to a mucous surface, the nerves of the part are excited, their vital manifestations are at first augmented, and the capillaries are ultimately expanded or enlarged; the tissue assuming more or less of increased volume. This erectile state, which all vascular parts present in a greater or less degree, according to their vascularity, and the extent to which they are supplied with organic nerves, generally subsides when the irritation is withdrawn; but if it continues to act energetically, and especially if it affect the action of the heart, and thereby occasion general irritation or febrile commotion, the expansion of the extreme vessels may proceed so far as to solicit, upon hydraulic principles, so great a flux of blood through them as may overcome their power of vital resistance, or may occasion the exudation of this fluid through their pores, which, owing to their distension, acquire an increased diameter, and allow the red particles of the blood to exude. This result is still more likely to occur, when organic nervous power is deficient or depressed, as it frequently is in the constitutions and circumstances in which hæmorrhages occur.

10. The effect thus produced by material irri-

tants may take place from an excited state of the organic nerves supplying the tissue—the primary affection being in these nerves, and occasioning the vital expansion of the capillaries, the increased afflux of blood to these vessels, and all the contingent phenomena. Such appears to be the procession of morbid changes in many cases of active hæmorrhage of an idiopathic or primary kind. The first change takes place in the organic nerves of the affected part, and occasions the vital expansion of the capillaries, and thereby an increased flux of blood through these vessels, and the larger trunks supplying them; the excited state of the nerves, and the increased action of the vessels, being propagated to the heart through the medium of the organic nervous, and vascular systems. Thus febrile commotion is induced in the more active forms of hæmorrhage. If we attend closely to the symptoms in such cases, we shall find a sense of titillation, and of increased heat, with throbbing of the vessels, &c., ushering in the discharge of blood. These symptoms clearly indicate the first change produced on the organic nerves, and its effects upon the circulation of the part. At last the blood pours forth, and shows that the tone or power of resistance in the extreme vessels has so far yielded to the increased momentum of blood, as to allow the escape of a portion of this fluid through the pores of these vessels, and of the tissues in which they ramify; the vital cohesion of the tissues either being originally weak, or having become weakened by pre-existent disease, as in the case of consecutive hæmoptysis, or of hæmorrhage occurring in the course of fevers.

11. From this it will be seen, that, in active hæmorrhage, more or less excited action exists in the seat of the discharge, and, when it commences in this seat, it is propagated to the heart in the manner above stated. The mere demand which is made upon the heart by the augmented afflux of blood solicited by the dilated and discharging capillaries, is insufficient to account for the characteristic phenomena of this form of disease, without calling into aid the organic nervous influence, and the reaction consequent upon the sudden depletion of the vessels during a state of plethora. It will explain increased rapidity of the pulse, but little more. Whilst, however, I thus contend for the frequency of excited action in the seat of hæmorrhage, often confined chiefly to that situation or its vicinity, or extended more or less throughout the frame, and assuming various grades of activity, it must not be overlooked that this action is generally attended by impaired nervous power or tone, and weakened cohesion of the extreme vessels and tissues in which they ramify. In proportion to the feebleness of vascular action, and to the loss of vital tone and of cohesion of the capillaries and tissues, will the hæmorrhage present more of an asthenic or passive character. But there is no absolute or unvarying grade, to which the terms sthenic or active, and asthenic or passive, can be applied; but every degree of action, as well as of diminished tone, either above or below the healthy standard, will present itself in practice. This association of excited vascular action and capillary expansion, with weakened nervous tone and vital cohesion, argued far above, is fully evinced by the state of the pulse, which, in

most hæmorrhagic diseases, is broad, open, compressible, soft, and sharp; the parietes of the artery being felt as if yielding to the impulse of the heart, but quickly reacting upon the momentum with which the current of blood is propelled; thus imparting a sharp, or bounding, or jerking character to the pulsation.

12. It is not only an irregular distribution of organic nervous power, with vascular excitement and deficient tone, by which hæmorrhages are frequently characterised; but the diminished cohesion of the extreme vessels, and of the tissues in which they ramify, above alluded to, is often the prominent feature of the pathological conditions in which these diseases originate.—This diminution of vital cohesion in the part is generally associated with debility; and with weak, although frequent, or even excited, action of the heart; the phenomena varying with the state of action, or the degree of excitement. or, indeed, with the modified grades in which the different elements of this pathological state present themselves. In such cases, the dilated and congested capillaries, the deficient nervous power, and the generally weakened vital manifestations of the frame, require, in their different grades, the accurate recognition and attention of the practitioner. In many cases of truly *asthenic* hæmorrhage, the frequency of the pulse is mistaken for excitement. But, in these, the frequent contractions of the heart are the necessary consequence of the loss of blood, and of the imperfect tonic contraction of the series of circulating vessels upon their contents—are the result of the loss of tension in the vascular circle, and of the facility with which the current is propelled in a relaxed and yielding channel.

13. ii. *Changes in the Structures, the Seats of Hæmorrhage.*—The escape of red blood from the vessels generally takes place upon those surfaces most engaged in exhalation and secretion, and in those structures, which, owing to their natural laxity, furnish a slight support to the capillaries supplying them. Yet extravasation will not take place, as already remarked, during a healthy state of the part, or when its vital cohesion is undiminished. It generally supervenes in consequence of certain lesions of the action and organisation of the vascular and capillary systems, or of the tissues which they supply, or of both together. But it should not be overlooked, that a change in the state of the tissues will generally, sooner or later, affect the capillaries supplying them, whilst a lesion of the latter will also affect the state of the former. The question, therefore, chiefly regards the priority of affection, and the extent to which either becomes changed. But it should also be admitted, that the lesion may be co-ordinate and co-ordinate in both the capillaries, and in the tissues the seat of hæmorrhage.

14. Discharges of blood seldom take place to any amount, excepting in textures which furnish, from original conformation, or from diminution of vital cohesion, an insufficient support to the capillary vessels; and which imperfectly enable them to withstand the distending power to which they are subjected, by the occasional increase of the heart's action, and of the momentum of blood passing through them; or by an impeded return of blood through the veins; or by general or local plethora. This important pathological fact is

demonstrated by the occurrence of hæmorrhages as a consequence of softening of the mucous surfaces, or of cellular and parenchymatous structures, or of serous membranes; particularly when their vital cohesion has been diminished by constitutional disease, and when the impulse or action of the heart and arteries has been increased by any external or internal cause. The sanguineous discharges occurring in dysentery, scurvy, purpura hæmorrhagica, fever, &c., are familiar instances of the influence of deficient cohesion of the tissues in the production of hæmorrhage; and epistaxis, hæmoptysis, hæmorrhoids, &c., illustrate a combination of this state with increased vascular action, in which both the heart and arteries participate.

15. iii. *Of Changes in the circulating Organs and Vessels in the Production of Hæmorrhage.*—As to the state of the capillaries in hæmorrhage, it is unnecessary to advance much beyond what I have already stated (§ 13.), because their conditions are very intimately associated with the states of nervous power and of vascular action characterising the attack. In all the more idiopathic hæmorrhages, the vessels cannot be said to undergo any rupture. Their minuter ramifications and extremities seem to be dilated, and their pores, whether lateral or terminal, so far enlarged by the deficient tone and cohesion of their parietes, and of the tissues in which they terminate, as to admit of the exudation of a large portion of the blood flowing through them. This state of the capillaries in the seat of hæmorrhage is, however, generally associated with other important changes in the circulation, and in the blood itself. The changes in the circulating organs vary in the different states of hæmorrhage. Those which precede and induce the discharge are generally different from those which accompany it, and ought to be carefully distinguished. They are principally the following:—1st. Increased action of the heart, and general febrile commotion, as above explained—as in *active, sthenic, or febrile hæmorrhages*.—2d. Determination of blood to the seat of hæmorrhage; or active congestion of its capillaries and larger vessels, with symptoms of excited action of the part and its vicinity chiefly—as in *sub-acute* cases.—3d. Very frequent or very weakened action of the heart, with depressed nervous power, impaired tone of the circulation, and laxity of the soft solids—as in *asthenic, passive, or non-febrile hæmorrhages*.—4th. Impeded circulation, and consequent congestion of the venous system, arising from disease of the heart.—5th. Interrupted circulation through the liver, or impeded return of blood from any viscus or part—as in some *symptomatic hæmorrhages*.

16. The *first, second, and third* of these states have been sufficiently explained.—In the *first and second*, however, the dependence of the hæmorrhage upon inordinate action and hypertrophy of the heart should not be overlooked; effusion of blood within the cranium or into the lungs being occasionally caused by this organic lesion.—The *second* pathological state of the circulating system commonly precedes the discharge, or exists chiefly at its commencement—is frequently the immediate cause of the hæmorrhage and is generally removed by it, as in epistaxis, &c.—In the *fourth* of the above states, the hæ-

morrhage is entirely owing to the venous congestion or plethora induced by the cardiac disease. Extravasations of blood from this cause, generally assume states intermediate between active and passive. The obstruction to the circulation through some one of the cavities of the heart, extends its influence to the venous capillaries, and these also become congested. The action of the heart and arteries being unimpaired, or even increased, by the obstacle to the circulation through the veins, the congestion of the capillaries is thereby augmented, until, at last, their contents partially exude through their parietes or pores in the situations where they are of the greatest tenuity, or are weakest, or the least supported by the structures in which they are distributed. This form of hæmorrhage is analogous to the inflammatory action which occasionally takes place under similar circumstances; and differs from it chiefly in respect of the states of vital cohesion and tone in the vessels and tissues affected, and of the fluids discharged from the diseased parts. Where inflammatory action is the consecutive affection, the organic nervous power of the part, and the tone of the capillaries, have not been overpowered by the congestion or local plethora to which they had been subjected, but re-act upon the causes of distension. When, however, hæmorrhage is the result, we may infer, either that the tonic action of the capillaries has been overcome, and the blood has exuded through them, as just stated; or that the cohesion of the tissue has been so weakened as to deprive the capillaries of the necessary support, and thus to favour their dilatation and the consequent effusion; but it is very probable that this result more frequently arises from the co-existence of both these changes, than from either of them singly. This reasoning equally applies to the hæmorrhages consequent upon obstructed circulation through the liver, or interrupted return of blood through any part of the venous system. A large proportion of cases of hæmatemesis, of intestinal hæmorrhages, of hæmorrhoids, of hæmoptysis, and of extravasations into parenchymatous organs, are caused in part, if not altogether, by this state of the circulation; although debility, vascular plethora, &c. are also often concerned more or less in their production.

17. iv. *Of the States of the Blood in Hæmorrhages.*—Changes in the circulating fluid, as to quantity and crasis, are more concerned in the production of hæmorrhage, than modern writers have admitted.—In the *first* of the pathological states of the circulating system (§ 15. 16.), the blood possesses nearly its natural crasis; and, when vascular excitement is considerable, it often presents similar appearances to those in inflammation, and is not remarkably deficient in fibrine. In this state of the disease, especially, marked evidence of vascular plethora has preceded and ushered in the attack.—In the *second* state of the circulation (§ 15.), the blood may be of natural appearance, or it may participate slightly in the inflammatory or sthenic characters; or its crassamentum may be loose, and either large or small, for the quantity of serum. Its fibrine may be also more or less deficient. In this state, general as well as local plethora usually exists at the commencement of the

18. In the *third*, or decidedly *asthenic*, pathological condition (§ 15.), the blood is more manifestly altered than in either of the above. It usually does not separate into a firm coagulum. Sometimes no separation into crassamentum and serum takes place; and, if it does so separate, the former is loose, dark, or even black, particularly in its lower part, and readily mixes with the serum, in which it is occasionally sunk, appearing like a black deposit at the bottom of the vessel. In some cases, the blood flows from the part like a dark cruor or sanies, without coagulating, or contributing thereby to the arrest of the discharge: in other instances, it is pale, thin, and watery. The deficiency of fibrine in all these circumstances is very remarkable. In several, the serum is unusually albuminous. In this form, there may be general or partial vascular plethora at the commencement of the attack; but I believe that a state of anæmia is sometimes present, particularly when the blood is pale, thin, and watery; at least, there is an obvious deficiency of fibrine and of red particles. This state of the circulating fluid is sometimes primary; is not infrequently associated with a lax or delicate organisation of the extreme vessels; and evidently contributes to the production of the hæmorrhage: the weak or lax capillaries giving a ready issue to the thin fluid, especially in its state of deficient crasis.

19. Whilst the *first*, *second*, and *third* pathological conditions of the vessels above noticed, — which may be considered as constituting the more idiopathic forms of hæmorrhage — are thus attended with various morbid states of the circulating fluid; some of these states, however, being proper to, or the usual concomitants of, these conditions of the vessels; it should be recollected that each of these conditions insensibly passes into one another, and that each of those morbid appearances of the blood is variously modified and combined; so that hæmorrhagic diseases, in the different forms, states, and complications in which they present themselves to our notice, are occasionally accompanied with every morbid change comprised in the article on the *Pathology of the Blood*. Moreover, the appearance of this fluid varies, at different stages of the same seizure, with the quantity lost, and with the depression of vital power thereby produced; so that when the hæmorrhage has been to a very considerable amount, the proportion of serum becomes relatively much increased, owing to the rapid absorption of fluids into the circulation from the *prima via*, and different tissues and organs; the density of the coagulum being, at the same time, more or less diminished, and the quantity of fibrine remarkably lessened, as the *asthenic* passes into *asthenic* action, until, at last, fibrine can scarcely be detected in the more *asthenic* or passive forms of the disease.

20. Of the frequency of *plethora*, general or local, as an element of the pathological condition ushering in hæmorrhage, the practitioner should be fully aware; as the removal of this state is intimately connected with the prevention and judicious treatment of the disease. The quantity, as well as distribution, of the blood in the system, the state of organic nervous power, by which local determinations of blood are chiefly produced, the degree of vascular action, and the turgidity of the part affected, vary with the *age* of the

patient, with his constitution and temperament, and with the nature of antecedent or associated disorder. It may be stated as a general inference, that hæmorrhages are more referable to excited action of the heart, to irritation in the seat of discharge, and to a dilated or morbidly erectile state of the capillaries, conjoined with increased action of arterial vessels, and, consequently, that they partake more of an acute, active, or sthenic character, the earlier the age of the patient. On the other hand, they more evidently depend upon obstruction to the venous and capillary circulation; on a *softened*, relaxed, or diseased state of the structure, in which they occur; and on lesions of the vessels themselves; and, therefore, are more commonly of a passive or asthenic kind, or, at least, present the lower grades of activity, the more advanced the periods of life at which they take place. As to the influence of *age* on the forms of hæmorrhage, my opinions are not very different from those of STAHL, in whose writings may be found much of what has more recently been advanced on the pathology of this class of diseases.

21. v. REMOTE CAUSES OF HÆMORRHAGE. — *a. Predisposing causes.* — The frequency of hæmorrhages, especially their more active states, is greater in the sanguineous, the irritable, or the sanguineo-bilious temperaments, in plethoric constitutions, and in the scrofulous diathesis, than in the nervous, lymphatic, and melancholic temperaments, and in spare habits of body. — They are more common and abundant towards the completion of youth, than at any other period; and they are comparatively rare in infancy and in old age. Females are more subject to them than males. They occur sporadically, and are more frequent in spring than at any other season; but are scarcely ever epidemic; although at Breslaw they prevailed at one time to a remarkable extent, — children having epistaxis, adults hæmoptysis, and the aged hæmorrhoids. There may be said to be a hæmorrhagic diathesis; inasmuch as hæmorrhages are more common in the offspring of parents who have experienced attacks, than in others; and as they are often observed in several children or members of the same family. M. СНОМЕР, remarks that hæmorrhages from the rectum, urinary organs, and uterus, occur oftener in cold than in warm seasons; and that epistaxis and hæmoptysis takes place more frequently in summer than in winter. I believe that this is the case, especially during dry states of the air. In childhood, hæmorrhage takes place chiefly from the pituitary membrane; in adolescence, from the bronchial surface; and in mature age, from the rectum, the urinary and uterine organs. — Whatever tends to increase the quantity of the circulating fluid, is, so far as it has this effect, a predisposing cause of hæmorrhage; as too much or too little nourishing food, indolence, the suppression or retention of accustomed discharges, the neglect of requisite evacuations, and the loss of a limb.

22. *b. The exciting causes* are — sudden increase of temperature; great dryness, and the rapid diminution of the weight, of the atmosphere; the use of alcoholic liquors or of other stimulants; violent mental emotions, especially anger, joy, &c.; too warm clothing, or too warm apartments; muscular exertions, quick walking or running; ascend-

ing heights; and various chemical and mechanical irritants. These causes generally give rise to the more active or *sthenic states* of the disease. Dr. PARR very justly disputes the rarefying influence of heat on the blood in the production of hæmorrhage, and refers the operation of this agent chiefly to the living solids. There can be no doubt of heat not only exciting the nerves, but also causing an expansion of the extreme capillaries and increased fluxion to the parts affected by it.—The usual causes of debility—as insufficient and unwholesome nourishment, the depressing passions, fatigue, contamination of the circulating fluids by impure or close air, poisonous injesta, exhausting secretions, masturbation, &c.—principally occasion *asthenic hæmorrhages*.

23. vi. The SYMPTOMS differ very remarkably according to the situation and circumstances in which hæmorrhage takes place. They vary also with its extent and rapidity—according as it constitutes the principal lesion, or is a contingent and comparatively unimportant phenomenon. When extravasation takes place in the substance of an organ, the functions performed by such organ will be interrupted co-ordinately with its amount and rapidity; but when it occurs into one of the large serous cavities, little interruption of function is observed, until the effusion is so great as either to produce syncope or to embarrass the adjoining organs by pressure. Hæmorrhage from mucous surfaces is generally made manifest by its discharge through the outlets of the canals in which it takes place. Yet, even in these cases, the extravasated blood may be retained, although its quantity is so great as to give rise to the most serious results. The blood itself presents all the appearances already described (§ 17. 18.), according to the state of vital power and of vascular action, and the quantity and quality of this fluid. If it be contained long in any cavity or part, it will be coagulated, or grumous, or thick, dark, greenish, brown, or sanious, or otherwise altered, according to the situation, the period of retention, and the state of the patient. When extravasated blood passes through a large portion of the digestive canal, it is still more remarkably changed by admixture with the secretions, gases, and other matters in this situation. Hæmorrhage, as to quantity, varies from a few drops to several pounds.

24. A. The symptoms preceding and attending hæmorrhage differ so as almost to defy description.—The more active and *sthenic* forms are preceded by signs of general plethora and of increased action; slight horripilations, and a frequent, full, open, and jerking, or bounding pulse, often ushering in the attack. The more *asthenic* states frequently are unpreceded by any distinct premonition, and are unattended by vascular reaction; flaccidity of the soft solids, with a weak, soft, rapid, or expanded pulse generally accompanying the discharge. In the *former*, there is a sense of heat, tension, fullness, and throbbing, with slight or shifting pain, at the commencement, and often actual increase of temperature in and near to the seat of hæmorrhage. In the *latter*, these sensations are rarely felt, and increased temperature is not observed; general uneasiness, with pallor, shrinking, and coldness of the extremities, in various degrees, being common to both.—In the *active* states, the blood is florid, coagulates readily and firmly, and frequently ceases to be discharged

as soon as the evacuation has proceeded so far as to remove the plethora, and increased action occasioning it; the patient often feeling lighter and better from the attack. But this is by no means uniformly the case; as the hæmorrhage sometimes proceeds to a dangerous extent, not merely as respects the organ affected, but as regards the quantity of blood lost to the œconomy. This arises from the nature of the local lesion associating itself with the hæmorrhage, or from the vital depression caused by the discharge, or from the lost power of the capillaries, or from the difficulty with which local fluxion or determination of blood is arrested, when once established and an outlet given to it, particularly when the coagulating property of the blood is impaired owing to deficiency of fibrine, or from two or more of these causes conjoined.—In the *passive* states, on the contrary, the blood is dark, fluid, thin, or even pale, and incapable of coagulating firmly, or even at all. The powers of life sink still lower as the hæmorrhage proceeds, and become less capable of arresting it, until the relation subsisting between the action of the heart, the tonic contraction of the arteries upon their contents, and the quantity of the contents in respect to the power of vital reaction possessed by these vessels, is subverted; and the patient, in consequence of the subversion, experiences successive attacks of syncope, or suddenly expires.

25. In all cases where hæmorrhage proceeds so far as to depress the pulse, or does not stop after the plethora and increased action have been removed by it, and still more remarkably in the *asthenic* forms, pallor of the countenance and general surface, coldness of the extremities, a shrunk or empty state of the cutaneous veins, faintness or full syncope on assuming the sitting posture, are present, in a degree usually coordinate with the extent to which the discharge has proceeded.

26. B. The Duration of hæmorrhage is extremely various. It may only continue a few seconds, or many hours, or even days. It may persist with slight intermissions for months or even years. It may be continued, or remittent, or intermittent. When this last, it may be either irregular or periodic.

27. vii. The DIAGNOSIS of hæmorrhage requires but little remark, as the subject is more fully noticed hereafter. In cases of very sudden and copious internal hæmorrhage, causing syncope or sudden death, these results may be mistaken for the more common forms of syncope, or for death from apoplexy or from disease of the heart. But the remarkable pallor of the lips, tongue, gums, and general surface; the smallness and emptiness of the jugular and superficial veins; the circumstance of the veins not filling beyond where pressure is made; and the history of the case previously to, and at the time of, either of these occurrences taking place, will point out the nature of the disease, even although no external discharge of blood be observed.

28. viii. The PROGNOSIS entirely depends upon the situation and form of the hæmorrhage.—It is extremely unfavourable when it takes place into the structure of an organ. It is equally so, when it occurs into serous cavities. When it proceeds from mucous surfaces, the danger is generally very much less: it is, however, great, when it is symptomatic of structural disease of the vessels, or of any part of the circulating system, or

of tubercular formations, and when it unequivocally presents asthenic characters. The prognosis is the most favourable, when the hæmorrhage is primary or idiopathic; when it arises chiefly from plethora and excited vascular action; and when it is seated in mucous canals. The nearer to the outlets of these canals it takes place, the less is the risk from it.—Epistaxis and hæmorrhoids are unattended by any danger, unless in cachectic habits, or when there is serious associated disease of related parts; or when protracted, asthenic, or uncontrolled by treatment. But the prognosis must be formed from the states in which individual forms of hæmorrhage present themselves in practice.

29. ix. DIVISION OF HÆMORRHAGES.—Discharges of blood have been divided, in modern times, into certain forms or states indicative of the circumstances in which they take place. Their separation into *active* and *passive* has been very generally adopted since the days of STAHL, who first employed this division; and these terms, or their correlatives, *Sthenic* and *Asthenic*, have been retained for the purpose of expressing the states of vital power and of vascular action upon which hæmorrhages principally depend, in their more idiopathic states. They have likewise been very generally divided into *Idiopathic*, *Traumatic*, and *Symptomatic*,—an arrangement to which, as well as to the former, attention should be paid both in pathology and in practice; and which has been very generally followed, even when the terms *primary*, *essential*, and *spontaneous* have been adopted with reference to the first of these; and *secondary*, *consecutive*, or *sympathetic*, to the third.—Hæmorrhages have also been classed into *Constitutional*, *Accidental*, and *Critical*. WILLIS arranged them into *critical*, and *morbid* or *non-critical*; DARWIN, into *arterial* and *venous*; and RICHTER, into those proceeding from *rupture*, and those from *exhalation*. A much more elaborate arrangement has been proposed by LORDAT. He divides hæmorrhages into—1st, Those proceeding from a *general fluxion*;—2d, from *expansion*;—3d, from *local fluxion*;—4th, from *adynamia*;—5th, from *loss of resistance* in the part;—6th, from *expression*;—7th, from *wounds*;—8th, from *sympathy*. MM. PINEL and BICHATEAU have proposed a division of this class of diseases into—1st, *Constitutional*;—2d, *Accidental*;—3d, *Vicarious*;—4th, *Critical*;—and, 5th, *Symptomatic*. M. CHOMEL has arranged them into—*a*, *active*,—*B*, *passive*,—*γ*, *constitutional*, and—*δ*, *accidental*. Dr. CARSWELL has classed them as follows:—i. *Hæmorrhage from Physical Lesions*.—*A*. From solutions of continuity—*a*. Incised wounds;—*b*. Puncture;—*c*. Laceration;—*d*. Ulceration;—*e*. Mortification:—*B*. From mechanical obstacles to the circulation—*a*. Situated in the heart;—*b*. In the blood-vessels.—ii. *Hæmorrhage from Vital Lesions*.—*A*. From a modification of the functions of the capillaries—*a*. In vicarious hæmorrhage;—*b*. In hæmorrhage from erectile tissue:—*B*. From a diseased state of the blood—*a*. In *scorbutus*;—*b*. In some forms of *purpura*;—*c*. In some forms of typhoid fever:—*C*. From debility—in depending parts of the body.—The chief objection to this ingenious arrangement is the neglect of the states of vital power and of vascular action more or less characteristic of the primary forms of hæmorrhage.

30. The following classification will be found to comprise all those states of hæmorrhage which fall within the province of the physician, and respecting which a full inquiry has been instituted above.

i. HÆMORRHAGE FROM PHYSICAL CAUSES:—*A*. From sudden diminution of the weight of the atmosphere; support being thus removed from extreme vessels and from yielding tissues, &c., whilst the impulse, or *vis a tergo*, is undiminished:—*B*. From incision, puncture, or laceration of a vessel or vessels.

ii. HÆMORRHAGE FROM LESIONS OF VITAL POWER AND ACTION:—*A*. From excited action chiefly—*a*. Of the vascular system generally;—*b*. Of the vessels in the seat of hæmorrhage principally, or from local determination: *B*. From plethora—*a*. Associated with general excited action;—*b*. With local action or determination;—*C*. From debility chiefly—*a*. Associated with general debility;—*b*. With local action or determination;—*D*. From deterioration of the blood—*a*. Conjoined with debility and impaired action;—*b*. With excited action and exhausted vital power—as in certain states of fever, &c.—*E*. These constitute *passive* or *asthenic hæmorrhage*.

iii. HÆMORRHAGE FROM INTERRUPTED CIRCULATION:—*A*. Through the heart;—*B*. Through the portal vessels.—*C*. Through other venous trunks.—In all these venous and capillary congestion precedes, and chiefly causes, the discharge.

iv. HÆMORRHAGE FROM ORGANIC LESIONS:—*A*. From alterations of the vessels themselves.—*a*. From inflammation, softening, rupture, &c. of their coats;—*b*. From ossific, or other morbid formations in their tunics:—*B*. From lesions of the tissues the seats of hæmorrhage—*a*. From softening of the tissue;—*b*. From ulceration;—*c*. From tubercular formations, &c.;—*d*. From mortification.—The first and second of these orders comprise these forms of hæmorrhage which are usually denominated *primary*, *idiopathic*, or *essential*; the third and fourth, those which are commonly called, *secondary*, *consecutive*, or *symptomatic*.

31. x. TREATMENT.—The treatment must have strict reference to the morbid conditions on which hæmorrhage depends, and according to which I have attempted to arrange the forms and states of the disease. In the observations, however, about to be offered, I shall allude merely to those varieties which chiefly require medicinal aid, and pass over those demanding the active interference of the surgeon.

32. *A. Hæmorrhage from physical causes*, particularly from puncture, incision, and laceration, seldom falls within the province of the physician; but when it does, as when occurring in any of the internal viscera, the principles which should guide him in other cases ought to direct him in this: inordinate action should be restrained, in order to diminish the effusion and to prevent its recurrence; and extremely depressed power cautiously restored, especially when life is thereby threatened, or when the system is incapable of producing coagulable lymph, by means of which a firm coagulum may be formed, and further hæmorrhage be thus prevented.

33. When the hæmorrhage is caused by the sudden diminution of atmospheric pressure, the propriety of having recourse to bloodletting, unless vascular action be manifestly increased, is

questionable. The removal of the cause, when the hæmorrhage is urgent, should alone be confided in. In slighter cases, the sanguineous discharge generally disappears soon after the vascular system has accommodated itself to the novel circumstances in which it is placed.

34. *B. Hæmorrhages from changes in vital power and vascular action* interest chiefly the physician, and require the utmost pathological discrimination and practical decision. Upon the opinion that will be formed as to the degrees of augmented action, or of diminished power, or of vascular repletion, or of asthenia, not only will the success of the treatment, but also the life of the patient, depend. And amongst the most difficult of the many difficult topics with which the practical physician will have to concern himself, none is more difficult or more important than to discriminate the pathological conditions just mentioned.

35. *a. Hæmorrhage depending upon, or connected with, excited vascular action*, generally requires an antiphlogistic treatment; but with strict reference to the degree of action and of organic nervous power, and to the quantity of blood which has been lost. Of these states the practitioner should be capable of forming a correct estimate, and of directing remedies appropriate to them with a decision commensurate with the urgency of the case.—When the discharge takes place from vital organs, he ought not to confide in a single remedy only, however energetic or appropriate; nor even in a succession of remedies; but should so combine his means as that the one may promote the operation of the others.—*When the action of the heart and vascular system is increased*, especially if the patient be young, plethoric, or robust, *bloodletting*, general, local, or both; and *internal and external refrigerants*, conjoined with *sedatives* and *astringents*, are indispensable. But the practitioner should be careful in discriminating between the broad, open, quick, and irritable pulse frequently attendant upon hæmorrhage with deficient vital power, or upon the reaction following large losses of blood, and the full, hard, and jerking pulse more commonly observed at the commencement of sthenic hæmorrhage. I have already shown, in the article *Blood* (§ 58.), that copious losses of this fluid, especially when productive of vital depression or syncope, are generally followed by more or less of reaction. This reaction should be prevented from wholly supervening, or from reaching an inordinate pitch, lest it reproduce the hæmorrhage, and thereby endanger the life of the patient. When it occurs after large hæmorrhages, we should carefully determine, from the tone and character of the pulse, from its softness or compressibility, or action under the pressure of the finger, the degree of tone or vital power attending it. By thus endeavouring to estimate the exact state of the vascular action, attendant, as well as consequent, upon hæmorrhage, the conclusions, which will be arrived at, will suggest the most efficient means of cure.—In cases where the excited action has been preceded by a large loss of blood, we shall in vain attempt to restrain it by further depletion; for it will be generally found that, however excited the action, or frequent the pulsation, *vital power* is extremely depressed; and that a further depletion will only render the heart's action

more frequent, and the pulse more irritable. It is in such circumstances, especially, that a decided but judicious use of sedatives, refrigerants, and astringents, such as will be hereafter noticed, should be resorted to.

36. In cases unattended by general vascular excitement, or in those characterised chiefly by local determination, vascular action being manifestly concentrated, more or less, towards the seat of hæmorrhage, and proportionately diminished in other places, a principal part of the treatment should be calculated to derive the blood from the organ affected, and to equalise the circulation. In such cases, *cupping*, warm *pediluvia*, and, when vital power is much depressed, and the further loss of blood cannot be afforded, *dry cupping*, should not be neglected. This last means I have found of great benefit when extensively or repeatedly resorted to.

37. In general, leeches are not appropriate means of depletion in hæmorrhages, although they may be of service in removing the local congestions or inflammatory irritation sometimes consequent upon them. Cupping should be preferred when local depletion is required; and in most instances in which bloodletting is indicated, even in a small quantity, venesection will be the preferable mode of performing it. Most of the older writers advised, for the removal of hæmorrhage, venesection in the standing or sitting posture, and with a large orifice, with the intention of speedily producing syncope; believing that a coagulum would be more likely to form at the orifices of the bleeding vessels during this state. If the hæmorrhage proceeded from one or more large vessels, as in wounds and injuries, the propriety of this practice need not be disputed. But when the blood is merely exuded from the mucous surface, as in most cases of internal hæmorrhage, this practice is of more doubtful efficacy; and, if it were generally adopted, even in young and robust persons, might be injurious, especially if the discharge had been already copious. Besides, the reaction consequent upon full syncope may cause a return of the effusion. It will, therefore, be preferable, in the majority of instances, to carry the depletion no further than to produce slight faintness, avoiding the supervention of full syncope; and to give refrigerants or astringents and anodynes so as to prevent subsequent reaction.

38. *β. Evacuations by emetics and purgatives* may be either beneficial or prejudicial, according to the peculiarities of the case. But the circumstances indicating or contra-indicating their use, will be made manifest, when I come to consider hæmorrhage with reference to its seats.

39. *γ. Refrigerants* are important agents in the controul of sthenic hæmorrhage, and much discrimination may be shown in the selection of them for particular cases. In general, those which are astringent, and increase the crasis of the blood, should be preferred.—The *mineral acids*, especially the sulphuric, the sulphates, the nitrates, the vegetable acids, particularly the acetic, and the internal and external application of cold, are severally useful in various circumstances.—The most energetic, however, of these, are the *sulphate of alumina* or the *super-sulphate of potash*, given in the compound infusion of roses, and the *super-acetate of lead* with acetic acid; but, in these, the

astringent is equally powerful with the refrigerant action. The *nitrate of potash* and the *muriate of ammonia* are useful refrigerants, but are most beneficial in the circumstances about to be noticed. Cold, internally, as iced water or iced lemonade, &c., or externally, in any of the various forms of applying it, is an useful adjuvant of other means; but it should not be employed so as to give rise to reaction, or to favour congestion in the seat of the disease, — consequences which may follow its injudicious use, internally as well as externally.

40. *3. Astringents*, in active hæmorrhage, are most serviceable, after evacuations have been carried as far as circumstances permit. They should be either conjoined, or alternated, with refrigerants; and occasionally, also, with demulcents and sedatives or anodynes. Any of the individual substances belonging to this class of medicines may be employed according to the urgency of the case; but, with the exception of the spirits of turpentine, the mineral are more energetic than the vegetable astringents. Of the former of these, the *sulphates* of alumina, of zinc, of copper, and of iron, are most frequently employed, either alone, or in vehicles containing diluted sulphuric acid. The tincture of the *muriate of iron* and the *nitrate of silver* are also often used, both externally and internally; but these, and all the vegetable astringents, with the exception just made, are also tonic, and are less serviceable in active than in passive hæmorrhages. In the former, however, they are often useful; and, when given in doses so large as to occasion nausea, they have also a sedative action. The *acetates of lead*, with acetic acid, and the *acetate of zinc*, are, on account of their sedative action, amongst the most appropriate mineral astringents in active hæmorrhage.

41. The spirit of *turpentine* appears to have been employed by the ancients in the treatment of hæmorrhages. It was much used, both internally and externally, during the sixteenth century, but had afterwards fallen into disuse. In the year 1817, I employed it internally in these diseases, and have since continued to prescribe it. (See my *Memoir on the Use of Terebinthinate Remedies in Disease*, Lond. Med. and Phys. Journ. for July and August 1821.) It constricts the capillaries of the part to which it is applied; but, owing to its stimulating action on the nerves, sthenic vascular reaction frequently follows; which, however, soon subsides. When used in large quantity, these effects are proportionately great; and it thereby exerts a powerful derivative influence. When absorbed into the circulation, its astringent effects on the capillaries are also remarkable. Its action varies much with the dose, relatively to the vital energy of the patient. When the dose is large, it reduces the frequency and strength of the heart's action, especially when they are much increased; and hence it is an appropriate remedy in the more active forms of hæmorrhage, inasmuch as, with its constricting action on the capillaries, it weakens the *vis a tergo*. When given in smaller doses, and carried into the blood, it increases the tone, and changes or modifies the action of the extreme vessels. From a very extensive experience of this medicine in hæmorrhagic and other diseases, I may add, that large doses of it should be prescribed with caution, when the powers of life are very much depressed; and that, when a considerable dose of it has been

given in such cases, it ought to be carried off by stool. The existence of inflammatory action does not contra-indicate its use, as many have supposed from a misconception of its operation; for it lowers vascular excitement, and prevents effusion and the formation of coagulable lymph, especially when taken in sufficiently large or repeated doses. When the powers of life are much impaired, and after copious evacuations of blood, small and frequent doses of it only ought to be given, conjoined with tonics, aromatics, restoratives, &c.

42. *e. Sedatives and Narcotics* are severally beneficial in active hæmorrhages, but chiefly as adjuncts of more energetic means. The most useful sedatives, in this form of the disease, have already been noticed. — *Hydrocyanic acid* and its preparations are sometimes of service, when much irritability, spasm, or restlessness, attend or follow the hæmorrhagic attack. *Digitalis* is, however, more generally appropriate, inasmuch as it lowers the action of the heart, and increases the tone of the extreme vessels. — *Narcotics*, especially opiates, are frequently serviceable in similar circumstances, but chiefly in combination with astringents and refrigerants. *Opium* may be conjoined with any of the substances comprised in these classes of medicines; or the acetate of morphia may be given with the acetate of lead, or the muriate of morphia with the murated tincture of iron. *Ilyoseyamus*, conium, the humulus lupulus, colchicum, and other narcotics, have been severally recommended to palliate some of the contingent phenomena of the disease; but they require no further remark.

43. *f. Diaphoretics* have been employed with the view of equalising the circulation, or determining it to the surface of the body, especially when coldness of the extremities and skin accompanies the discharge. But the cooling diaphoretics should only be prescribed — as the nitrate of potash with the sweet spirit of nitre, and the solution of the acetate of ammonia with an excess of acetic acid. In order to derive to the surface, and to equalise the circulation, external derivatives, rather than stimulating diaphoretics, ought to be employed. — The derivatives most to be confided in, in these cases, especially when the hæmorrhage is copious, are the hot turpentine epithem or embrocation, or sinapisms; but the former is much more quick and efficient in its operation, than the latter.

44. *g. Demulcents*, especially the gums, were formerly much employed in hæmorrhage; but are now seldom used, unless as vehicles or adjuncts of more active substances. They are, however, of service in several forms of hæmorrhage, especially where it is desirable to diminish irritation in mucous passages or canals. Powdered gum, when applied to a bleeding vessel or surface, will sometimes arrest the discharge by promoting the coagulation of the blood.

45. *b. Hæmorrhages depending upon asthenia, or the more passive states of hæmorrhage noticed above*, should be attacked directly by means of astringents and derivatives. — *a. Bloodletting* is generally inadmissible; and *refrigerants* must be employed with caution, unless their astringent action be very considerable. Even cold should be cautiously prescribed. In some cases, the momentary impression of cold, as of iced water sprinkled on the back or on the genitals, is of service; but a prolonged application of it may be

injurious, or even dangerous. The *vegetable astringents*, as possessing more or less of a tonic property, are especially indicated in the asthenic forms of hæmorrhage; and, of these, the *extract of catechu*, *kino*, the preparations of *krameria*; *tannin* and *powdered galls*; the bark of the root or fruit of the *pomegranate*; the *samarouba* and *cinchona* barks; infusions of *oak bark*, or of the *ura ursi*, or of *roses*, or of the root of *tormentilla*, or *bistorta*; the *vegetable acids*, also, especially the *gallic* and *acetic*; *kréosote* conjoined with the latter of these, or with some other vegetable astringent; the *ergot of rye*; the *terebinthinates*; the *balsams*, and *camphor*, are severally appropriate; and either of them may be prescribed with other means, according to the circumstances of the case. Of these, the spirit of turpentine, in small and frequent doses, with tonics, restoratives, and aromatics, is most deserving of confidence. The *mineral astringents*, especially those already noticed (§ 40.), and the *tonic mineral salts*, may also be employed.

46. *β*. When hæmorrhage proceeds chiefly from, or is connected with, a *deteriorated state of the circulating fluids*, the *chlorate of potash*, or the *chlorate of lime*, may be prescribed with tonic or astringent infusions; and the nitrate of potash may be added, or taken alone in similar vehicles. The spirit of turpentine may also be given in small and repeated doses, with camphor and aromatics.

47. *γ*. In all the forms of asthenic hæmorrhage, *derivatives*, especially the hot turpentine epithem and sinapisms, are of great benefit.—*Emetics* and *cathartics* are rarely indicated; although morbid secretions and fecal accumulations ought to be evacuated.—*Diuretics* are of service chiefly as adjuncts of more energetic means.—*Anodynes* are rarely necessary; but digitalis is sometimes useful, conjoined with tonic astringents.—*Opiates* are also occasionally serviceable, in similar combinations.

48. *δ*. In those *intermediate states of hæmorrhage*, in which it is difficult to determine whether the active or the passive conditions predominate, and where there appears to be an irregular distribution of action and vital power, rather than general excitement or depression of either, *derivation by dry cupping*, by the warm turpentine embrocation, or by sinapisms, and the internal use of appropriate astringents, are chiefly to be relied on.

49. *c*. Those forms of hæmorrhage which may be denominated *constitutional*, and which partake more of the active than of the passive character, require much discrimination. They are generally dependent chiefly upon absolute or relative plethora; and ought not, therefore, as in many other cases of active plethora, especially when thus associated, to be early or officiously interfered with. This form should, therefore, be promoted when incomplete, or treated by depletions, and moderated or arrested when it becomes very considerable or excessive.—When a constitutional hæmorrhage is abortive or prematurely arrested, sanguineous effusion may take place in the parenchyma of an organ, or in some dangerous situation. In this case, the morbid deviation should be combated by means calculated to restore the hæmorrhage to its former seat, to arrest it in the part consecutively affected, and to prevent the bad consequences likely to ensue in the latter situation.—If the hæmorrhagic deviation—

the change in the seat of constitutional hæmorrhage—is favourable, as when epistaxis or hæmorrhoids occur, instead of hæmoptysis or hæmatemesis, the interference of art ought not to be interposed, unless the loss of blood is very considerable or alarming.

50. *d*. When hæmorrhage depends upon *obstructed circulation in the heart, liver, or lungs*, and, consequently, upon venous plethora, the indications are—to remove this obstruction as much as possible; to diminish the fulness of the veins; to determine predominant action to external parts; and to impart tone to the surface and capillaries affected. The means by which the first of these ends is to be accomplished, are pointed out in the articles on the diseases of the organs just mentioned; and those which will accomplish the other intentions have been already noticed.

51. *e*. In all forms of hæmorrhage, the indications of cure, as well as the individual means, should more or less depend upon the causes, upon the seat, and upon the quantity, of the effusion; and should, moreover, be modified by the symptoms, by the age, and the previous state and habits of the patient. For the hæmorrhages which mainly depend upon organic lesions, the treatment should be directed to the removal of these lesions; but, when the effusion is considerable, or takes place into the substance of an organ, immediate means ought first to be used to arrest it; and these means should be strictly appropriate to the states of vascular action and of vital power, conformably with the principles already developed. It is indispensable to the judicious treatment of hæmorrhage, to ascertain and to remove the remote and immediate causes; and to place the patient in a situation and circumstances favourable to the removal of the attack, as well as to the prevention of its recurrence. Hæmorrhage from the lungs, the stomach, intestines, and urinary organs, as well as into the parenchyma of internal viscera, and into shut cavities, are serious occurrences, and should be immediately arrested. When it proceeds from the nose or anus, it is seldom dangerous, and may be left to itself, unless it become excessive. Whenever the loss of blood, in whatever situation it occurs, is so great as to produce much debility, prompt measures should be employed to arrest it. If syncope takes place in such circumstances, the recumbent posture; the aspersion of cold water, or of a small quantity of eau de Cologne or lavender water, on the face; or aromatic vinegar held at a little distance from the nostrils; will restore the patient. But if the hæmorrhage has been so great as to render these means insufficient, an immediate recourse may be had to the transfusion of blood from a healthy person. When convulsions supervene upon large losses of blood, opium, with camphor or other restoratives, should be prescribed.

52. *ii. Of Regimen and Prophylaxis.*—*a*. In *active hæmorrhage*, the patient should be removed to a cool apartment, and repose of body and mind enjoined. He ought to be so placed as that the seat of effusion is most elevated. The clothes should be taken off or loosened; and every obstacle in the way of external applications removed. — When the hæmorrhage has ceased, the same antiphlogistic regimen as was pursued during its

continuance, should be persisted in for some time; and gradually changed. If the effusion have been slight, and particularly if the pulse continue full or strong, venæsection or cupping should be practised, or even afterwards repeated, in order to prevent a recurrence of the hæmorrhage, or the supervention of congestion or inflammatory action in the part. When the discharge and the treatment have removed both the attack, and the attendant general and local plethora, the practitioner should endeavour to ascertain still further the pathological conditions from which the hæmorrhage proceeded, as well as those which remain after it, and to remove them. He ought also to enjoin the avoidance of whatever may cause plethora, or may determine the circulation to the seat of hæmorrhage, or weaken organic nervous power. If the symptoms indicating the recurrence of hæmorrhage appear, a full venæsection should be practised.

53. The *Diet* ought to be chiefly farinaceous; and ripe acidulous or mucilaginous fruits should be liberally allowed. The drink should be made slightly acid, by vinegar, or any of the mineral or vegetable acids. This diet ought to be continued long after the attack. The strong or rich wines, all malt liquors, and spirits, should be uniformly shunned.

54. *b.* After *passive hæmorrhage*, the system should be strengthened, by means the least likely to cause plethora; by regular and moderate exercise in the open air, near the sea; by sea voyaging or short excursions; and by avoiding whatever is likely to favour congestion of the seat of the former effusion, and to depress the mind.

55. *c.* The *repetition* of hæmorrhage, whether of an active, passive, or intermediate character, ought to be carefully prevented; as two evils result from this circumstance, independently of the danger directly connected with it: if the attacks are slight, they are apt to become habitual or constitutional; and, whether slight or severe, they cause disorganisation of the part affected. When hæmorrhage has become habitual, it should not be prematurely suppressed, without having recourse to vascular depletions in its stead, or instituting some external discharge; and even this latter may not be sufficient.

56. *d.* *Constitutional hæmorrhage*, when it is abundant and debilitating, should be treated, in the intervals, by a spare and cooling diet and regimen. Positions which will favour the flux of blood to the organ affected, or impede the return of it, should be avoided; and direct or indirect excitement or irritation of the part, ought to be removed. Whatever tends to produce plethora, or to weaken nervous power, and vascular tone, should also be shunned. (See art. CRISIS, for *Critical Hæmorrhage*; and ARTERIES and VEINS, for *Hæmorrhage Symptomatic of Organic Lesions of these Vessels.*)

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HÆMORRHAGES CONSIDERED WITH RESPECT TO THEIR SEATS.

57. In treating of hæmorrhage, as regards the situations in which it takes place, I shall notice it — FIRST, *In parts which admit of the external discharge of the effused blood*, as from the skin, and from the mucous surfaces; the latter of these comprising the most important of the diseases usually denominated hæmorrhagic. — SECOND, *In serous or shut cavities, necessarily followed by a greater or less accumulation of the effused blood*. — THIRD, *In the ureal tissues or parenchyma of the viscera*. — In discussing the particular forms of hæmorrhage according to this arrangement, due reference will be made to the vital conditions and morbid relations upon which hæmorrhages were shown, above, more or less to depend.

11. HÆMORRHAGE FROM THE SKIN. — SYN. *Hæmorrhagia per Cutem; Hamatidrosis*, Ploucquet; *Sueur de Sang*, Chomel.

58. DEFIN. — *An exudation of a sanguineous*

fluid from a part or the whole of the cutaneous surface, most frequently the former, without abrasion of the cuticle.

59. Hæmorrhage very rarely takes place from the whole of the cutaneous surface; and rarely even from a limited part. The effusion of blood under the cuticle, as in scurvy and purpura, &c., is different from the form now being considered, in which it is external to this tissue. — When the hæmorrhage is from the cutaneous surface, generally it assumes the form of a sanguineous sweat or perspiration. The situations to which it is most frequently limited, are — the face or cheeks, the anterior parts of the chest and armpits; the mammae and mamillæ, the groins, the umbilicus; the palms of the hands and soles of the feet; and the heels, toes, and fingers. It may occur in these situations without any abrasion of the cuticle or change in the skin; but it also sometimes proceeds, both in these and in other parts, from cicatrices, nævi, or other alterations of structure.

60. Hæmorrhage from the cutaneous surface generally has been noticed by BEVERNIUS, TUTTIUS, WYFFER, SCHENCK, GARMANNUS, RUYSCH, LENTIN, STAHL, PEZOLD, and RICHTER; and a few cases of it are given in the *Ephemerides Academicæ Naturæ Curiosorum*. I never saw an instance of it. My learned and scientific friend, Dr. W. HUTCHINSON, informed me that, during his residence in the Ukraine, he had a fine Arabian horse, whose sweat, upon most occasions of exertion, was sanguineous; and was nearly pure blood upon great exertion. It was general, and unattended by any other sign of disease. — Hæmorrhage from the face has been observed by VOGLT and PELISSON. It has occurred in rare instances during epileptic convulsions: I saw a case of this kind. Discharges of blood from the mammae and nipples are more frequent, and have been seen by SCHENCK, AMATUS LUSITANUS, MARCELLUS DONATUS, MERCKLINUS, VANDER VIEL, PANAROLUS, PAULINI, BIERLING, HOFMANN, SCHURIG, TRIORN, DELIUS, RICHTER, WEGELIN, JACOBSON, and myself. Hæmorrhage from the umbilicus has occurred chiefly in young children, or during the first weeks or months of infancy. Cases of this kind have been noticed by FABRICIUS, SHUSTER, RADFORD, and others, and have generally terminated fatally. Mr. POUT has detailed a case which thus terminated, and which was the third in one family. Exudations of blood from the armpits, groins, and extremities, especially the fingers and toes, have been remarked by WYFFER, ZACUTUS LUSITANUS, MERCKLIN, HAGENDON, ASH, MUSGRAVE, AB-ILERS, RIEDLIN, BARTHOLOLINUS, ORLOVIVS, WHYTT, and THILENIUS. Hæmorrhage from cutaneous nævi, and from the cicatrices of ulcers, is not an infrequent occurrence, especially in females in whom the catamenia are suppressed. In this case it assumes the form of vicarious menstruation.

61. i. Causes. — Cutaneous hæmorrhages are evidently more or less connected with the state of the constitution and of the circulation. They have been seen at all ages, and more frequently in females than in males. They most commonly appear after the suppression or cessation of accustomed sanguineous or other discharges; more especially the menstrual. When they take place from the breasts, they often recur periodically,

and replace the catamenia. They are sometimes caused by great exertion, by violent emotions, by sudden terror or fright, and by great muscular efforts. **MAYER** states that he saw a case in which the hæmorrhage returned twice annually, about the equinoxes upon muscular exertion.

62. ii. The *Phænomena* attendant upon cutaneous hæmorrhage have not been closely observed or described. In some cases, where the exudation was partial, pain and redness of the surface preceded it. In others, the blood has issued from a greater or less extent of the skin, in a manner similar to the perspiration, of which it seemed to constitute a part. It has varied in deepness of colour and in fluidity, as well as in quantity. Upon wiping it off, the skin has presented no change of structure, and has continued still to exude the blood from its surface. The discharge has seldom been of long duration, although it has frequently recurred. Where it has been vicarious of menstruation, and has proceeded from the mammae, or from *nævi*, or from a cicatrix, increased fulness, redness, and heat of the part has generally preceded it for a short time.

63. iii. The *Prognosis* of cutaneous hæmorrhage is generally favourable, when it is partial unless it be dependent upon internal disease. When it is general, it is not unattended by danger. The soft solids and the blood itself are then generally more or less in fault; and this seems to be not less the case when it has been caused by violent mental shocks or sudden fights.

64. iv. The *Treatment* should altogether depend upon the states of vascular action and vital power; and ought to be conducted according to the principles developed above. If the hæmorrhage has followed the suppression of an accustomed discharge, the restoration of this latter ought to be attempted. If it has proceeded from fright or moral emotions, antispasmodics, restoratives, and sedatives should be administered. If it be evidently passive, and very abundant, it ought to be moderated or restrained by tonic astringents, internally and externally prescribed.

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III. HÆMORRHAGE FROM THE NOSE. — SYN.

Ἐπιστάξις (from *ἐπίσταζω*, I flow drop by drop); *Ἀιμορραγία*, Hippocrates; *Hæmorrhagia*, Linnæus, Sagar, Sauvages; *Hæmorrhagia nasinea*, Hoffmann; *Epistaxis*, Vogel, &c.; *Hæmorrhagia Narium*, *Sanguinis Stillatio*, vel *Stillicidium* è *Naribus*, Auct. var.; *Hæmorrhagie nasale*, *Saignement du Nez*, Fr.; *Nasenblutfluss*, Germ.; *Bleeding from the Nose*.

65. DEFIN. — The effusion of blood externally from the pituitary membrane.

66. There is no part of the body more disposed to hæmorrhage, than the pituitary membrane; and none in which the recurrence of the discharge is productive of so little injury, as respects either this structure or the constitution. It is necessary to a due consideration of the pathological and therapeutical relations of epistaxis, to recollect, that this membrane is supplied by the external and internal branches of the common carotid arteries; and that its blood is returned partly into the external jugular veins, and partially, by anastomosing branches of veins, into the anterior veins and sinuses of the cranium. The blood effused from the pituitary membrane may be discharged either by the nostrils, or by the mouth after having passed into the posterior fauces. This latter very generally occurs when the patient is in a supine posture; it then not infrequently flows into the pharynx, and is swallowed. If the quantity of blood is great, which thus passes into the stomach, irritation of this organ, and of the intestinal canal, sometimes followed by vomiting of the blood — by a pseudo-hæmatemesis — or by *melæna*, not infrequently supervenes. On the other hand, blood may be discharged through the nostrils, without having been effused by the pituitary membrane. This occurs when a sudden or profuse hæmorrhage takes place from the pharynx, bronchi, or stomach; but it is not, and therefore should not be confounded with, epistaxis.

67. i. The *Phænomena* of Epistaxis are well known; but the signs of its occurrence, and the true pathological states ushering it in, are not so generally recognised or justly estimated. — *A.* The *precursory symptoms* vary much according to the grades of vital action, of local determination, and of general or local vascular fulness, preceding and attending it; and upon these pathological conditions entirely depend the hypersthenic, sthenic, or asthenic, — the tonic, or atonic, — the active or passive character of the hæmorrhage. In proportion as it partakes of a hypersthenic or sthenic form, the more manifestly will it be ushered in by one or more of the following symptoms; — by pain of the head or face; by vertigo, stupor, or somnolency; by frightful dreams, or restlessness; by redness or heat of one or both cheeks; injection of the eyes or lachrymation; by flashes of light before the eyes, or affections of the sight; deafness, or noises in the ears; increased strength of pulsation in the temporal or carotid arteries, and fulness of the veins; and by a sense of fulness,

tension, dryness, heat, or of titillation or itching of the nostrils. Not infrequently, especially in the more passive or asthenic states, the hæmorrhage occurs without any premonition, or merely after a slight touch or local irritation. The character of the pulse varies with the degree of vascular action and of vital power; and in proportion to the grades of both it is full, strong, and rebounding. According, also, as both action and power are weakened, the pulse becomes frequent, soft, compressible, open, small, and undulating. The older writers considered that a dirotic or rebounding pulse indicated the occurrence of this, or of some other hæmorrhage; but no great dependence can be placed upon this symptom.

68. *B.* The hæmorrhage may take place from one or both nostrils; but in the latter case it is greater from one than the other. The quantity of blood discharged may vary from a few drops to many pounds; and, in the more obstinate passive states, the patient may be reduced to the utmost danger, or may be carried off in a few hours, or days, according to the continuance or violence of the discharge. In some cases, a fibrinous and more or less firm coagulum attaches itself to the part whence the hæmorrhage proceeds, and occasionally hangs out of the nostrils over the upper lip, or down into the posterior fauces. As long as this remains attached, the discharge continues suppressed; but when removed prematurely or otherwise, it returns, even with increased violence and danger. The disease may be *continued, remittent, and recurrent, or intermittent.* In this last case it may return irregularly or periodically.

69. *C.* The more active or simply *sthenic* epistaxis is often *symptomatic or critical* of several acute diseases, attended by increased action; especially the more inflammatory kinds of fever, and inflammations of the brain, or of the lungs, &c.—The *passive forms* are frequently *symptomatic* of several cachectic maladies; and of the last stages of malignant or low fevers.—Many writers, even as recent as the FRANKS, suppose that, in cases of epistaxis consequent upon enlargements or obstructions of the liver, or of the spleen, the hæmorrhage is generally upon the same side as the enlarged viscera.

70. *ii. CAUSES.*—*A.* Epistaxis occurs most frequently in children and young persons, especially in its more idiopathic states. It affects most commonly the sanguine, irritable, the plethoric, and florid; and those possessed of great talents, of delicate or relaxed fibres, of weak constitutional powers, and of much sensibility. After ten or twelve years of age, it is often observed in the male than female sex. It is not infrequent in males about the change to the decline of life; and then, as well as at later periods, often prevents more serious hæmorrhagic or inflammatory attacks. Epistaxis is also often dependent upon peculiarity of constitution or diathesis, and is consequently, often hereditary, or observed in several of the descendants of the same parents, or members of the same family.—At advanced ages, it is most common in those who live luxuriously and partake largely of wine or malt liquors. In the more mature periods of life, it is most frequently *symptomatic*, or dependent upon disease of the heart, of the liver, spleen, or of some other viscus; or consequent upon the disappearance of some sanguineous or other evacuation.

71. *B.* The *exciting causes* are extremely numerous and diversified; for whatever favours an increased flux of blood to the head, and to the pituitary membrane; or retards the return of this fluid from these parts; or occasions general plethora; or weakens the vital cohesion of this membrane, or the tone of the vessels ramified in it, may occasion hæmorrhage from it, when the predisposition already exists.—*a.* The *external causes* are—injuries; irritants or excitants inhaled into the nostrils; stimulating vapours or gases; fractures of adjoining parts; exposure of the face to fires or furnaces, or of the head to the sun's rays, either uncovered, or with a black or metallized hat or cap.—*b.* The *internal causes* are—whatever increases the flow of blood to the head, as anger, shame, or other states of mental excitement or mental disorder; protracted study, and great exertions of the mind; stooping, or a low or depending position of the head; frequent sneezing; catarrh; febrile, inflammatory, and exanthematous diseases; headaches, and rheumatic affections of the face;—whatever retards the return of blood, as deep sighs, exertions of the voice, laughing, singing, crying, &c.; playing on wind instruments; severe cough or difficulty of breathing; sudden terror; disease of the heart or adjoining large vessels; tumours pressing upon the jugular veins, or other causes of obstruction to the circulation in them, or in the subclavians; congestion of the lungs; neckcloths or collars worn too tightly around the neck, &c; whatever causes absolute or relative plethora, as too full living, the ingurgitation of large quantities of wine, or other exciting liquors; the suppression of accustomed evacuations, especially the catamenial and hæmorrhoidal, &c.;—whatever interferes with the equal distribution of the blood, as wearing tight clothes, or corsets, obstructions in any of the large viscera, the gravid uterus, excessive distension of the stomach or bowels, or enlargement of the spleen, epileptic or convulsive seizures, cold applied to the extremities, suppression or retention of the natural discharges, and unnatural positions of the body;—whatever weakens the tone of the vessels in the pituitary membrane, and diminishes the crasis of the blood, as the advanced state of low fevers, scurvy and other cachectic maladies, frequent returns of the complaint, &c.;—whatever determines the blood to the superficial parts of the body, as diminished pressure of the air, high range of atmospheric heat, &c. The epidemic prevalence of epistaxis (which is of very rare occurrence) may be attributed to this last cause. (See MORGAGNI, *Epist.* xiv. ch. 25.)

72. *c.* The blood is chiefly exuded from the capillaries of the pituitary membrane, as in hæmorrhages from other mucous surfaces: but the question frequently agitated, as to whether it proceeds from arterial or venous capillaries can hardly be solved; nor does it deserve the trouble of inquiry. J. P. FRANK observes, that he has frequently seen a varicose state of the veins after cases of chronic epistaxis. The more important considerations as to the pathology of the disease, are those which relate—1st, to the states of vascular action, and vital tone attendant upon it;—2d, to the constitution and habit of body of the patient;—3d, to previous attacks of hæmorrhage, either from the nose or from other parts;—4th, to antecedent and associated disorders, or to ten-

lencies to be affected by dangerous maladies, as apoplexy, palsy, hæmoptysis, phthisis, &c.; 5th, to the causes, predisposing and exciting;—6th, to the probable consequences of an immediate arrest, or of a continuance, of the discharge;—and, 7th, to its critical influence.

73. iii. The Prognosis should have more or less reference to the circumstances just enumerated. It is generally favourable, when the disease occurs in children, or persons about the age of puberty, who are otherwise healthy; but, if epistaxis affect the cachectic, the strumous, those who have evinced a tendency to affections of the lungs, or of the glandular and lymphatic system, or those labouring under disease of the heart, lungs, or spleen, or who are aged, the prognosis ought to be more guarded, inasmuch as the hæmorrhage may be difficult to restrain; or, when arrested, it may return; or may be followed by still more serious results, as by hæmoptysis, or by an aggravation of the associated malady, or by fatal syncope upon using exertion, or assuming a sitting posture. The more sthenic the epistaxis, the less the risk from it, unless it be prematurely restrained. But when it is manifestly asthenic, and copious—if the means of cure fail, and if the blood is thin, dark, or does not coagulate—if the powers of life sink, and the skin and lips assume a pale or waxy hue, the prognosis should be unfavourable, in proportion to the prominence of these changes.

74. In persons who have arrived at, or passed, middle age, the above circumstances (§ 72.) and considerations should, especially, have due weight; and even the contingencies of the attack—whether suppressed, or allowed to continue as far as the immediate safety of the patient will warrant—ought to be fully estimated. Where disease of the heart, especially passive dilatation of one or more of its cavities, or attenuation of its structure, or a disposition to apoplexy or palsy, or engorgement of the liver or spleen, exists, an opinion of the immediate or ultimate consequences should be stated with caution.—When slight epistaxis takes place in the plethoric, or in those addicted to indulgences at table, the circumstance ought to be viewed as indicating the danger of the habit, and the probable occurrence hereafter of apoplexy or palsy, if a more spare diet and suitable regimen be not observed. In forming an opinion of the terminations of nasal hæmorrhage, the remote consequences of the continuance or suppression of it upon related organs should be considered, in connection with the causes and the accompanying phenomena. When the epistaxis appears as a salutary evacuation of an overloaded vascular system—when it has been caused by full living or intemperance, or preceded by headachs, noises in the ears, injected eyes, affections of any of the senses, &c.—the prognosis ought to have reference chiefly to the cerebral disease which it has averted; and the indications which it has evinced should not be lost upon the practitioner, nor upon the patient.

75. iv. TREATMENT.—a. Upon visiting a patient with epistaxis, the first glance will often enable the practitioner to decide whether or not he ought to arrest it without delay. When the countenance does not at first furnish sufficient grounds for immediate determination, inquiries ought to be made as to the age, constitution, habits, and previous ailments of the patient; the causes which

occasioned the attack; the symptoms ushering it in, and attending it; the quantity and appearance of the blood discharged; and the existing indications of internal disease; in order that a safe conclusion may be arrived at as to this and other parts of the treatment. When one or more of the following circumstances appear at all prominent—if the patient be robust or plethoric; if he have lived fully, and drank wine or malt liquors freely or daily; if he have experienced active disease in the head, or attacks of congestion, or determination of blood to this part; and if head-ach, redness of the eyes or face, increased heat of the scalp, throbbing of the vessels, or a beating noise in the ears, have ushered in the attack, and more especially if they still attend it; the discharge should not be arrested until the vascular system is relieved; and when this is accomplished, the epistaxis will cease of itself. If it should seem to cease prematurely, and particularly if the above symptoms still continue, depletions, purgatives, and an antiphlogistic regimen ought to be prescribed.

76. b. When it is desirable to arrest the discharge, the means of cure should be directed with the intention—1st, of deriving the current of circulation from the seat of hæmorrhage; and 2d, of constricting the capillaries of the pituitary membrane. With these views, the patient ought to be placed in a cool and airy apartment, with the head elevated, or held upright, and the feet plunged in warm water. The neck should be bared, and cold fluids aspersed over it and the face, or cold substances applied upon the nape, or upon the forehead. If these fail, evaporating or iced epithems may be placed over the whole of the head, or the cold effusion may be directed to this part, and an active cathartic exhibited. The most appropriate cathartics in such cases are calomel with iubarb or jalap, and the spirits of turpentine with castor oil; but a full dose of the latter may be given in two or three hours after the former has been taken.—Emetics have been advised by STOLL; but they ought not to be given early in active epistaxis. They are most serviceable when the attack has been induced by an overloaded stomach.

77. Bleeding is required chiefly in the circumstances just alluded to (§ 75.), and in the more sthenic forms of the disease; but it should not be neglected, in these circumstances especially. It may be necessary to repeat it, even oftener than once, and after longer or shorter intervals. The older writers recommended bleeding from the feet; and many modern Continental practitioners order leeches to be applied to the anus or to the vulva, when the epistaxis has arisen from the suppression of the hæmorrhoidal or catamenial discharge. When it has become habitual, or periodic, and especially if it be vicarious of menstruation, the recurrence of the discharge may be anticipated by the application of leeches to the tops of the thighs near the groins; by aloëtic purgatives; by the semicupium or hip-bath; and by the exhibition of emmenagogues, especially borax, with the aloes and myrrh pill. In other circumstances, cupping over the nape or mastoid processes is preferable to other modes of vascular depletion. When the quantity of blood discharged is too great to admit of the loss of more, dry-cupping in the former situation should not be overlooked.—In the great majority of cases, however, the

sitting posture, with the head held backwards; cold applied to the face; or a piece of cold metal placed between the nape of the neck and the clothes; and cooling drinks, especially those with *acids*, *nitre*, &c.; will be sufficient to arrest the discharge.

78. *c.* When active epistaxis has proceeded so far as to require to be arrested, and has still continued, notwithstanding the foregoing means, the treatment then called for is also appropriate to the *passive* or *atonic* states of the disease. In these circumstances, the chief reliance must be placed upon astringents, applied to the pituitary membrane, and taken internally with tonics; upon pressure made locally; and upon the insufflation of substances into the nostrils, that may promote the coagulation of the effused blood. A solution of the acetate of lead, or of the sulphate or acetate of zinc, or of the sulphate of iron or of copper, or of the sulphate of alumina, or of the vegetable or mineral acids, or of the pyroligneous acid with *kræosote*, or of any of the numerous vegetable astringents (§ 40.45.), may be injected into the nostrils; or lint, moistened with either of them, introduced; but whilst astringents are being used locally, the exhibition of them internally should not be neglected. The superacetate of lead, with acetic acid, and small doses of opium, may be given internally; or other astringents may be taken with tonics; or small doses of spirits of turpentine resorted to, in the manner above recommended (§ 41.).

79. Finely levigated astringent powders, especially those of alum and of gall-nuts, may be blown through a quill into the nostrils; or substances of a glutinous nature may be employed in this manner, particularly powdered gums, as tragacanth or *acacia*; or astringents may be conjoined with these. Finely powdered charcoal may be employed in the same way. Pungent or irritating substances are often of less service than the powdered gums, which will, without exciting the Schneiderian membrane, favour the coagulation of the blood on its surface. Plugging the nostrils with lint moistened with some astringent solution, is sometimes successful; but when the hæmorrhage proceeds from the more posterior parts of the nares, it will fail, unless the lint be pushed so far backwards as to reach nearly to the pharynx. Care, however, ought to be taken that it does not irritate this part.—J. P. FRANK advises a piece of the intestine of a pig, closed at one end, to be introduced into the nostrils, and injected with a cold fluid. Some writers recommend thick mucilage, others a paste with charcoal or with astringents, and others the white of egg, to be conveyed into the posterior nares, in order to coagulate the effused blood.—When a coagulum has formed, either spontaneously, or by any of the foregoing means, it ought not to be disturbed for three or four days, or even longer, lest the hæmorrhage return.

80. *d.* Besides the above measures, others have been advised.—In order to derive from the seat of hæmorrhage, ZACIUS LUSITANUS directs the cautery to the lower extremities; CHRISTIEN, warm pediluvia, with mustard flower put into the water; BORELLI, bruised nettles to the feet and hands; NIEMANN blisters to the nape, and CHYZA to the arms; RIEDLIN, the exhibition of active cathartics; and CALIUS AURELIANUS, cupping on the occiput, GALEN on the hypochondrium,

and FORESTUS on the extremities. With the view of constringing the extreme vessels, cold drinks are prescribed by HOFFMANN; cold injections through the nostrils, by MORAND and MORGAGNI; the immersion of the head in cold water, by DARWIN; cold glysters, by LEUENNER and ANDRIEU; and cold applications to the genitals, by DIEMERBROECK, THEVEN, and MEUCIER. In addition to the local astringents already noticed, powdered agaric is recommended by RICHARD; writingink, by RIEDLIN; lemon juice, by BLANKARD; and spider's web, with vinegar, by CHESNIAU. The introduction of plugs moistened with spirits of wine is directed by MORGAGNI and RATH, and with the expressed juice of the common nettle, by PRÆVOTIUS; and plugs consisting of dough, or chalk-paste, by AVICENNA and DIEMERBROECK. The injection of a strong solution of isinglass is prescribed by LENTIN; and carded lint, drawn or pushed into the posterior nares, is employed by AUDOUIN.

81. The internal use of the acetate of lead, with opium, is advised by REYNOLDS and LATHAM; of the phosphoric acid, by HEDDL; of the aromatic sulphuric acid, by HUIELAND; and of the ergot of rye, by SPAJRANI, CAMINI, RYAN, and NIGRI.—The first of these may be employed in either the active or passive states of the disease; but the phosphoric acid is admissible only in the latter. In passive epistaxis, camphor with opium; the spirits of turpentine, in small and frequent doses, with aromatics and restoratives; the chlorates of potash or of lime; the sulphate of quinine with camphor, &c.; *assa-fœtida* with myrrh, and opiates in small quantity (SYDENHAM), are amongst the most energetic medicines that can be taken internally; but external means ought also to be resorted to.

82. *e.* If epistaxis be vicarious of menstruation, the return of an attack should be prevented only by endeavouring to restore the catamenial discharge. If it be periodic, especially in persons who have suffered from agues, congestion or enlargement of the liver or spleen should be dreaded; and if either be found to exist, deobstruent purgatives, followed by tonics, particularly quinine or the other preparations of cinchona, or FOWLER's solution of arsenic, ought to be prescribed; but local depletions should be freely employed previously to these, whenever the liver is the seat of such disorder. When epistaxis occurs in aged persons, either the early suppression of the discharge, or its continuance, may be followed by serious results. It is generally connected with a disordered state of the circulation within the cranium in such cases. What has been stated above will indicate the circumstances in which it will be advisable to interfere; but repeated blistering behind the ears, in some instances cupping in this situation, a seton in the nape, and other measures which the peculiarities of the case will suggest, with a suitable regimen, ought not to be neglected.

83. *f.* If the hæmorrhage from the nares seems to be *critical*, the observations offered in the article CRISIS are altogether applicable. When it appears in the last stage of low fevers, or in scurvy, or in purpura, and is merely the consequence of the lost tone of the extreme vessels, with diminished vital cohesion of the mucous surfaces, and a deteriorated state of the blood, the treatment directed for the passive form of epistaxis, or

for putro-adyynamic fever, is quite appropriate, if the discharge be so considerable as to require measures to be adopted for it.

84. g. The after-treatment of epistaxis is often of great importance, especially in persons of middle or advanced age. An attack, whether slight or severe, in those who live fully, ought to be followed by an antiphlogistic regimen. Where the discharge has prematurely ceased, bloodletting should always be prescribed. In order to derive permanent advantage from this treatment, abstinence, regular exercise in the open air, and a due subjection of the mental emotions, ought to be constantly observed. How fatally this may be neglected, is shown by the following case:—A gentleman, aged about 50, of a very full habit of body, accustomed to live richly, and to take his wine freely, but not in excess, became subject to severe headaches. He afterwards had an attack of epistaxis, which continued until the loss of blood was very great, although means were used to arrest it. He recovered, and remained well for many months; yet his usual diet and regimen were persisted in. His headaches, as may have been expected, returned; he became depressed in spirits, and disliked society; but no appropriate treatment was prescribed—or, at most, aperients only were directed. The indications furnished by the epistaxis were entirely lost upon the patient and his medical attendants—abstinence was not adopted by the former, nor precautionary bloodletting by the latter. The consequences may be readily anticipated. He shortly afterwards was struck with apoplexy associated with hemiplegia; for which I was consulted just before his death.—This is, however, not the only instance of the kind which has come before me in practice. I could state the particulars of several cases in which the neglect of the indications afforded by epistaxis, has been followed by apoplexy, palsy, epilepsy, mania, and inflammation of the brain and its membranes.

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IV. HÆMORRHIAGE FROM THE MOUTH AND THROAT.—*SYN. Hæmorrhagia Oris, H. Puerum, Stomatorrhagia, J. P. Frank*; *Sanguinis Profusum ex Ore, Hæmorrhoides Oris*, Vogel; *Hæmorrhagie buccale*, Fr.; *Mundblutfluss*, Germ.

85. A discharge of blood from one or more of the parts forming the mouth and throat.

86. Hæmorrhage may take place to a great, or even fatal, amount, from the gums, the tongue, the fauces, or the pharynx; and even from the insides of the cheeks and lips. Blood is rarely, however, discharged from one or more of these parts, unless in the advanced stages of cachectic diseases, or of malignant or low fevers.—*A. RIVERIUS* mentions a case in which four or five pounds of blood were discharged from the lips every month. Hæmorrhage from this part has been observed also by *ZACUTUS LUSITANUS*. *J. P. FRANK* met with a case in which it proceeded from varicose veins of the upper lip. I lately saw an instance of varicose veins of this part, but there was no hæmorrhage. Bleeding from the interior surface of the cheeks is generally owing to injury from the teeth, or to tumours.

87. b. Discharges of blood to a small amount from the gums are very common, especially in the advanced stages of the diseases just adverted to; and more abundantly after suppression of accustomed discharges, as the catamenial or hæmorrhoidal. Vicarious menstruation may even take place from this situation. Severe or dangerous hæmorrhages from the alveolar processes have been most frequently caused by the extraction of teeth. *FRANK* has seen several pounds of blood lost from a varicose state of the veins of, and in the vicinity of, the gums: and similar discharges have more frequently taken place from tumours in this situation, and from the excessive use of mercury. *VOGL* met with an instance in

which the discharge was produced by a combination of mercury and belladonna. HIRSCH, FRANK, and others, have met with periodic hæmorrhage from this part, vicarious of menstruation. Fatal effusions from the gums have been seen by HONSTIUS, FABRICIUS, HILDANUS, and several more recent writers.—The occurrence of hæmorrhage in this situation in purpura hæmorrhagica, scurvy, and the diseases adverted to above (§ 86.), is too well-known to require further notice.

88. c. Hæmorrhage from the tongue very rarely takes place to any very considerable amount, unless in cases of injury of the arterial veins or arteries, as in dividing the *frænum lingue*, when it may prove fatal. Slighter injuries from the teeth, especially during epileptic fits, seldom cause more than small discharges of blood. But the more serious diseases to which the tongue is liable (see art. TONGUE) may be followed by dangerous or even fatal hæmorrhage. Such instances are recorded by PLATER and others. MARI saw 24 lbs. of blood discharged from this part; and J. P. FRANK met with a case of *glossitis*, which, upon passing into gangrene, terminated fatally with profuse hæmorrhage.

89. d. Hæmorrhage from the palate and fauces to a very considerable amount has been observed by BUNDI, VOGEL, FRANK, and KLUIG. J. P. FRANK believes it generally to proceed from a varicose state of the veins in this situation; and hence the appellation, *Hæmorrhoides Oris*, applied to it by VOGEL and BUNDI. He mentions an instance in a young man, who, for many years, suffered repeated attacks of hæmorrhage from this state of the veins of the palate; and who was permanently cured, after a profuse discharge, by a strong solution of alum. PORTAL met with a case where the hæmorrhage took place from the *uvula*.—A more or less copious effusion of blood may also proceed from the *velum palati* or *tonsils*, especially in the course of cachectic diseases, or as a consequence of a varicose state of the veins of the part, or of those in the vicinity.

90. e. Effusions of blood from the surface of the pharynx occur more frequently than is commonly supposed, and are overlooked in consequence of the fluid having passed into the stomach. When the hæmorrhage from this situation is very considerable, the quantity of blood which is swallowed is often so large as to cause vomiting, and to lead to the supposition that the stomach is the seat of the disease. The small veins in the pharynx are not infrequently varicose or obstructed; and when this is the case, hæmorrhage sometimes takes place from comparatively slight causes. The most dangerous discharges from this part occur in the advanced stage of putro-adynamic fevers, and of cynanche maligna, in which the pharynx is more or less affected. J. P. FRANK has noticed the occasional supervenition of pharyngeal hæmorrhage independently of those diseases: but the subject has been overlooked by other writers. Some years ago, I attended a lady, about 70 years of age, residing at St. John's Wood, who complained of dyspeptic disorder complicated with psoriasis and sore throat. The veins of the pharynx were reticulated and varicose. I was afterwards called to her suddenly on account of a very severe hæmorrhage, attended by vomiting and cough. Much of the blood evidently was brought up

from the stomach, but a great part passed directly from the throat. The cough arose from the irritation caused by the fluid on the epiglottis and pharynx. The effusion was arrested for a time by powerful astringents. Two days afterwards, the hæmorrhage returned more violently than before, and terminated life before I reached her. On examination after death, the pharynx was found softened, black, and studded with soft aphthous ulcerations, between which dark blood was infiltrated. The veins of this part were numerous and dilated. The stomach contained a considerable quantity of blood. The upper part of the œsophagus was softened and congested in its internal surface. In this case, the blood had passed into the stomach, the position in bed having favoured this occurrence, and had irritated this organ so as to produce vomiting.

91. i. The SYMPTOMS and DIAGNOSIS of hæmorrhage from the mouth or throat are not always as distinct as may be supposed, particularly as respects the source of the discharge. The symptoms preceding the effusion are very uncertain; and are those most commonly indicating congestion of the head or adjoining parts, or disease in one or other of the above situations. Headach, vertigo, noises in the ears; soreness, irritation, titillation, tension, or a sense of fullness or heat in the throat; a bloated appearance of the countenance, and throbbings of the vessels in the vicinity, sometimes usher in the hæmorrhage. If the patient be in bed when attacked, the irritation of the fluid on the glottis causes cough; and the passage of it into the stomach is followed by vomiting, when the quantity is considerable, or the stomach irritable. If hæmorrhage take place from the pharynx whilst the patient is asleep, the blood will flow into the stomach; and the first intimation of the occurrence will often be the vomiting of blood. Hence the utmost care is required to distinguish this species of attack from hæmoptysis on the one hand, and from hæmatemesis on the other, as it may closely simulate either. In order to do this, the mouth ought to be well washed by a slightly astringent and colourless fluid, or the throat gargled, and afterwards carefully examined. If the hæmorrhage be too copious to admit of inspection of the mouth and throat, the patient should lean forwards, so as to allow the blood a free passage from the mouth; and if it flow without coughing or retching, and is neither frothy or very florid, nor very dark or grumous, there can be no doubt as to the situation whence it proceeds. If the patient feel it collect in the throat, and create a disposition to deglutition, or if he require no effort to bring or hawk it up, it manifestly proceeds from the fauces or pharynx.—In many instances, causing the patient to drink some fluid instantly before examining the throat will assist the diagnosis; and in others, the history of the case will be sufficient to settle the question.—When the fauces or pharynx is the seat of the discharge, deglutition of food or drink, or the use of a gargle, either before or during the hæmorrhage, will cause more or less pain. (See *Diagnosis of HÆMOPTYSIS and HÆMATHEMESIS.*)

92. ii. The CAUSES of stomatorrhagia are those of hæmorrhages generally; but more especially, previous diseases of a cachectic or malignant character; affections of the gums and teeth; repeated attacks of sore throat, particularly when connected

with chronic disorder of the stomach and other digestive organs; the use of mercury; injury or previous lesion of the vessels, especially the veins; and obstructed discharges, as the catamenial or hæmorrhoidal, of either of which, the hæmorrhage from the mouth may be vicarious.---The acronarcotic poisons may even cause it. In a case of poisoning by aconitum, which I saw some years ago, remarkable swelling of the tongue and fauces took place, followed by moderate hæmorrhage from these parts.

93. iii. The **PROGNOSIS** entirely depends upon the circumstances in which stomatorrhagia occurs—upon the previous state of disease, and upon the quantity of blood lost, and the effect thereby produced upon the constitution. The general principles above stated will also guide the practitioner.

94. iv. The TREATMENT of hæmorrhage from the mouth or throat requires to be materially modified, according to the parts from which the blood is effused, and the causes producing the effusion. Cases rarely occur, in which it is either necessary or proper to have recourse to bloodletting. Purgatives, however, especially those of a stomachic or tonic kind, are often beneficial—more particularly when the disease is connected with disorder of the digestive organs, and with accumulations of morbid matters in the *prima via*. The chief dependence is to be placed in the local and internal use of the more energetic astringents noticed above—as the sulphates, the acetic acid with kreosote, the acetate of lead or of zinc, spirits of turpentine the chloride of lime, &c. These may be used in gargles—in more or less concentrated solutions—and in various states of combination, as with gums or mucilages. If the hæmorrhage take place from a single vessel, or from a limited extent of surface, the actual or potential cautery is quite appropriate. If it proceed from the alveolar process, powerful styptics, and various mechanical measures, may be resorted to.

95. When hæmorrhage from the mouth depends upon general cachexia, or supervenes in the latter stages of putro-adynamic fever, or purpura or scurvy, the above means should be aided by the internal use of tonics, conjoined with vegetable or other astringents and antiseptics, as the chlorides, the chlorate of potash, the nitrate of potash, or the muriate of ammonia, &c., and by an appropriate regimen.—If the effusion seems to proceed from the pharynx, the position of the patient should be such as will favour the flow of the blood from the mouth, and prevent it from irritating, or escaping into, the larynx.

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V. HÆMORRHAGE FROM THE RESPIRATORY ORGANS.—SYN. *Hæmoptysis* (from αἷμα, blood, and πτύω, I spit, or πτύωσις, a spitting); αἱμοπτῦσις? αἱμοπτῦσις, Galen, Dioscorides; *Sanguinis Sputum*, Celsus; *Emoptoe*, Gordon; *Sputum Cruentum*, Cruenta *Expulsiō*, *Sanguinis Fluor*, *Vomitus Pulmonis*, Auct. Lat.; *Emoptoica Passio*, Gilbert; *Passio hæmoptoica*, Plater; *Hæmoptoë*, Boerhaave, Vogel, Darwin; *Hæmoptismus*, Auct. var.; *Hæmoptysis*, Sauvages, Vogel, Cullen, &c.; *Hæmorrhagia Pulmonum*, *Hæm. bronchica*, *Hæmorrhæa pulmonalis*, Auct. var.; *Pneumorrhagia*, J. P. et J. Frank; *Blutspeyen*, *Bluthusten*, *Lungenblutfluss*, Germ.; *Crachement de Sang*, *Expectoration de Sang*, Fr.; *Emotisi*, *Emotisea*, *Sputo di Sangue*, Ital.; *Blodspytting*, Dan.; *Pulmonary Hæmorrhage*, *Spitting of Blood*, *Coughing of Blood*.

96. DLFIN.—After a sense of heat, oppression, or pain in the chest, and titillation in the throat, the rejection of florid, frothy, or pure blood, from the bronchi or lungs, with a hawking or short cough.

97. *Hæmoptysis* is one of the most frequent varieties of hæmorrhage, owing to—(a), the very extensive bronchial and vesicular surface to which the blood is circulated for the purpose of undergoing the requisite changes during respiration; (b), to the delicate conformation of the capillaries and mucous membrane of this part; (c), to the liability of the lungs to congestions, from impaired organic nervous power, from obstructions of the pulmonary veins and of the circulation through the left side of the heart, and from tubercular or other lesions of the substance of the lungs; (d), and to the liability of this organ to derangements of its circulation from hypertrophy and other lesions of the heart, and from alterations of the large vessels.—Of all these morbid causes and connections, tubercular formations in the lungs are the most common, either as a cause of the hæmoptysis, or as associated lesions consequent upon the same antecedent changes in the states of vital power and vascular action, or as both.

98. i. SYMPTOMS, &c. — *A.* The premonitory signs of hemoptysis are—horripilations, passing redness and heat of the face, or flushings of the cheeks, headach, coldness of the extremities, with a collapsed or empty state of the veins of the surface; lassitude, and sense of weight of the limbs; occasionally cramps or spasms of the lower extremities; a feeling of internal warmth, particularly in the chest; pain or tension at the epigastrium or hypochondria; a burning sensation under the sternum, with more or less anxiety, inquietude, constriction, or oppression at the chest, or dyspnoea; a short, dry cough; dyspnoea, or shortness of breath, on slight exertion; a dull pain or soreness under the sternum, between the shoulders, or beneath the clavicles; palpitations; a quick, hurried, or excited pulse, which is sometimes also hard, full, bounding, or oppressed, &c.; flatulence, or borborygmi, costiveness, and pale urine. A few only of these symptoms, or several variously modified, may be present in individual cases; they may exist for a longer or

shorter time before the attack. In some instances, neither cough, nor difficulty of breathing, nor any symptom referrible to the chest, has been complained of; or it has existed in so slight a degree as to escape the observation of the friends of the patient; and yet the most extensive changes had taken place in the lungs, and caused the hæmorrhage. A case of this kind was attended by Mr. BUSHELL, Dr. CLARK, and myself, whilst this article passed through the press. Such instances, however, are not uncommon, as shown by RUODIUS, MÜLLER, WEDDEL, GRAMBERG, the FRANKS, LOUIS, CLARK, and others.

99. *B. Progress.*—As the blood rises to the larynx, a sense of titillation is felt in the trachea, or of irritation in the throat, with dyspnoea; and a gurgling or bubbling sensation in the chest or trachea; and the blood is either hawked or coughed up, exciting a sweetish-salt taste. As soon as this occurs, much alarm is sometimes caused, particularly in delicate or nervous persons; and several of the general symptoms, particularly those connected with the action of the heart and pulse, are owing chiefly to this circumstance. When the blood is in considerable quantity, the discharge of it is attended with a feeling of suffocation; the chest is forcibly dilated, a convulsive reaction or cough follows, and this fluid is ejected from both the mouth and nostrils. In some instances, the irritation at the top of the pharynx, and in the fauces, excites retchings; and in others, the blood, as it collects in the pharynx, is instinctively swallowed; and, when it has accumulated in the stomach, causes vomiting; and gives rise to a suspicion, from this circumstance, and from the presence of portions of ingesta, &c. as shown hereafter (§ 118.), that the hæmorrhage is seated in the stomach. Occasionally the blood is brought up without any effort whatever, beyond a strong expiration, which it accompanies in a full stream; and when retching or full vomiting is occasioned in the manner just stated, another and often a greater discharge of blood from the lungs attends it.

100. The quantity thus discharged, varies from a few drops to many pounds. RUODIUS (*Obs. cent. ii. 31.*) saw 23 lbs. lost in three hours; PEZOLD (*Obs. Med.-Chir. No. 49.*) and ZACCHTRIOT (*WEIGEL'S Ital. Biblioth. b. iii. p. 154.*) observed larger quantities during a much longer period. J. FRANK (*Prax. Med. &c. ii. 2. l. p. 417.*) had a patient who lost 192 ounces in twenty-four hours; and a friend of my own experienced nearly as great a discharge in the same time, and afterwards recovered. When the blood is not considerable as to quantity, it is frothy or contains bubbles of air, and is of a florid hue; when it is very abundant, it is fluid, generally more or less florid, but not frothy: it is seldom mixed with muco-puriform matter, unless it be small in quantity, and it then is often semi-coagulated, and of a darker or brownish tint; but, towards the termination of an attack, this appearance is very common.—If the hæmorrhage is very great, extreme faintness, or even full syncope, may come on: but a sense of depression, or sinking, with a quick, sibilous, and short respiration; a small, weak, interrupted voice and speech; and coldness of the extremities; are more commonly complained of. Occasionally, the least exertion of the voice, or of the

body, or a fit of coughing, increases or brings back the discharge; but as often it returns without any such cause.

101. In some instances, the attack is followed by great frequency of the pulse, and generally excited vascular action, with heat of skin, thirst, &c.; although the pulse had been perfectly natural before or at the time of seizure. In these, the congestion of the substance of the lungs connected with the production of the hæmoptysis has passed into inflammatory action, in one or several parts of the organ; or rather, the infiltration of a portion of the effused blood through the smaller bronchi has excited inflammation of them, as demonstrated by the stethoscope and by dissection. In many cases, especially when the hæmorrhage occurs in weak or lax frames, and scrofulous or tubercular state of the lungs, not only the external discharge of the blood, but also its passage along the bronchi into the more depending parts of the organ, and even its infiltration into the substance of the lungs, or its effusion in the distinct form of pulmonary apoplexy, takes place, as I have several times recognised during life, and ascertained afterwards by dissection.

102. An attack of hæmoptysis may be so severe and sudden as to suffocate the patient before a large quantity of blood is lost; or so continued as to destroy life by the loss of this fluid. Only one violent seizure may occur—the patient recovering perfectly, without suffering materially, after the immediate effects have passed off: but this is seldom the case; more or less disease of the lungs, although unapparent to the friends previous to the attack, following rapidly afterwards. In some instances, particularly when tubercles have proceeded to softening, &c. without exciting much disorder, the hæmorrhagic congestion, infiltration, and atonic inflammation of the substance of the lungs, attendant and consequent upon the seizure, soon destroys life. In several instances to which I have been called, the patients had pursued their usual avocations unconscious of ailment, been attacked by hæmoptysis, and died in three or four weeks afterwards in consequence of these associated lesions of the lungs. In the case above alluded to (§ 98.), death took place 26 days after the attack. More frequently the hæmoptysis is followed by pulmonary consumption in a much less rapid form. When the blood is ejected in small quantity, or of a brown colour, or is mixed with a rose-coloured lymph, or mucus, latent inflammation or active congestion most likely will be found to exist in the substance of the lungs; and this inference ought not to be doubted, if febrile symptoms, with cough, be present, or if the blood taken from the arm be buffed.—In a few instances, the lymph effused from the vessels towards the clove of the attack, is moulded into the form of several bronchi, and is expectorated in this state; in others, craceous or other earthy concretions, consequent on the degeneration, or the partial absorption, of tubercles, or even ossific matters, are brought up with the blood, or soon afterwards; but most frequently, and especially when the hæmorrhage is scanty, or towards its close, or after more than one attack, muco-puriform matter, with or without minute portions of softened tubercular substance, may be detected; and these become more manifest as the blood disappears.

103. Hæmoptysis may recur at irregular, or even at distant, periods; the patient experiencing but little ailment in the intervals, or presenting merely a marked susceptibility to congestion or inflammatory affections of the lungs. When supplemental of suppressed or retained catamenia, or of the disappearance of hæmorrhoids or epistaxis, it sometimes returns periodically. In such cases, the evacuation depends more upon vascular plethora, than upon serious lesion of the substance of the lungs; although this may also exist.—Some instances of a constitutional recurrence of hæmoptysis (§ 49.) have been observed, and yet a far advanced age has been reached.

104. C. *The appearances after death* comprise almost every lesion to which the lungs, heart, and large vessels are liable, but some of them are more immediately connected with hæmoptysis than others.—*Tubercles* are the most common of all these, in one stage or other of their progress, and frequently they are found in every stage even in the same case—either disseminated through the lungs or clustered—in a crude, softened, and ulcerated state—in connection with small or large excavations,—in some instances, the seats of the softened and partially absorbed tubercular matter containing earthy or cretaceous concretions; and, in rarer cases, the parenchyma of the lungs around them presenting a cicatrised or puckered appearance. When hæmoptysis has been very recent, the lungs are frequently more or less congested, and their substance infiltrated with dark blood, both throughout many of the minute bronchi and cells, and in the connecting cellular or parenchymatous tissue, large portions of the organ exhibiting a spleen-like appearance. In some cases, portions of the lungs are more or less obviously inflamed; the inflammatory appearances having been either antecedent to, or consequent upon, the hæmorrhage, most frequently the latter. In rarer instances, blood is effused in the substance of the organ, forming a distinct cavity filled with coagulated blood.

105. Adhesions between the pulmonary and costal or diaphragmatic *pleura*, both old and recent, frequently exist. The bronchial membrane is generally injected, congested, and of a deep or dark red, or purplish or nearly black, either throughout a large extent, or in parts or patches; but the state and colour of this surface vary with the period at which hæmoptysis took place, and the mode in which the disease of the lungs terminated the life of the patient. (See art. BRONCHI, § 3—14.) In rarer cases, gangrene of portions of the lungs, or erosion or ulceration of one or more vessels connected with softened tubercles or cavities, is observed. These cavities are generally lined with a more or less thick secreting membrane. In a few instances, osseous deposit has been found in the membrane of the cyst. (See art. LUNGS.)

106. Alterations of the large vessels in the chest, and of the heart itself, are occasionally found, especially in the cases of aged persons. The pulmonary veins have been seen diseased, inflamed, or partially obstructed by humours, or morbid depositions, either externally or internally. I found them inflamed, and a large branch partially obstructed by lymph, in one case. A dilated or varicose state of the pulmonary veins, has been noticed in connection with hæmoptysis,

by MORAGANI, GILLIBERT, PORTAL, and J. FRANK. Lesions of the pulmonary artery have also been met with, especially rupture (MATANI, *De Aneurism. Præcordior. Morbis*, p. 120.) and aneurismal dilatation (J. FRANK, &c.). Mr. SAMPLE has detailed a case, which he considered hæmatemesis, but which was probably hæmoptysis attended with vomiting, owing to the circumstances above pointed out (§ 99.); wherein the left pulmonary artery was obliterated, and the lung was extensively diseased. Aneurisms of some part of the aorta opening into the trachea, bronchi, or lungs, has been oftener observed than these. CRUICKSHANKS found the lymphatics of the lungs turgid with blood, absorbed from the air-cells, in patients who had died of hæmoptysis.

107. Diseases of the heart, particularly such as occasion obstructed circulation through the left cavities, as narrowing of the auriculo-ventricular opening, lesions of the valves, &c., are not infrequently found in connection with hæmoptysis (WILSON, WATSON, &c.). Hypertrophy of the ventricles, especially of the right ventricle, has been remarked, in rare instances. BERTIN, BOUILLAUD, and other French writers, attach considerable importance to this lesion as a cause of the hæmorrhage; but I agree with Dr. WATSON in considering the alterations which obstruct the passage of blood from the lungs as more frequent causes than this.

108. ii. CAUSES.—A. *The Predisposing Causes* of hæmoptysis comprise most of those already enumerated in connection with hæmorrhage generally (§ 21.), and of those which favour the formation of tubercular consumption. (See that article.) Those which are more especially concerned in the production of hæmorrhage from the respiratory organs are—Hereditary constitution; the scrofulous and the hæmorrhagic diathesis; sanguineous, irritable, and sanguineo-irritable temperaments; a plethoric habit of body; the period of life between seventeen and thirty-five; tallness of stature; a narrow or deformed chest; curvatures of the spine, rickets, or severe hooping cough in early life; sedentary occupations, especially at the writing-desk or drawing-table; a change of modes of life, as from active employments to inactivity; certain trades, as shoe-making and weaving; the spring and summer seasons; sudden or frequent vicissitudes of temperature and weather, especially rapid changes from cold to heat; suppression of accustomed excretions and discharges; and congestions or enlargements of the liver or spleen. M. LOUIS found hæmoptysis to occur among men nearly in the same proportion at all ages. GALEN, STRAMPIN, GOLTZ, and LOUIS, consider it to be more frequent in females than males. FRANK and CONRING entertain a different opinion; the latter remarks, that men are more prone to the disease than females, unless when the catamenia of the latter are suppressed. LOUIS found it more frequent in females in the proportion of three to two, and that their age was most commonly from 40 to 65. I believe that the predisposition to hæmoptysis is less, or at least not greater, in females than in males, until the period at which menstruation usually ceases; but that, after this period, the frequent occurrence of vascular plethora favours the production of pulmonary hæ-

morrhage. There is no doubt of the influence of premature and excessive venereal indulgences, and more especially of solitary vices of this kind, in favouring the occurrence of this and its allied diseases.

109. B. The *Exciting Causes* are chiefly external injury; fracture of the bones of the thorax; wounds of the chest and lungs; falls or concussions on the chest; physical efforts, particularly in lifting or carrying great weights; compression of the thorax by strait-lacing, &c.; running, especially against the wind, and hunting; protracted exercise with the arms, great exertions of the voice, reading aloud, or speaking for a long time; playing on wind instruments; inhaling irritating fumes, as those of acids; &c., or particles of dust, as in various occupations (see art. *ARTS and EMPLOYMENTS*, § 40.); foreign bodies fallen or drawn into the trachea and bronchi; cold in any form or mode of application; rarefaction, or great dryness of the atmosphere; the suppression of other sanguineous discharges; anger, and the more violent mental emotions; venereal excesses; terror, frightful dreams, or sudden surprise; severe fits of cough, of laughter, or of sneezing; straining at stool; and changes in the state of the blood. Besides these, many of the lesions just mentioned (§ 104. *et. seq.*) act as exciting causes, especially tubercles and their consequences; alterations of the vessels either in the seat of hæmorrhage, or near the centre of circulation; and difficult or impeded passage of blood through the heart, pulmonary vein, or aorta, &c.

110. C. The *seat of hæmorrhage*, in cases of hæmoptysis, has not always been recognised with precision. Previous to the writings of BICHAT, the effusion was very generally supposed to proceed from a ruptured or ulcerated vessel, arterial or venous. Subsequently it has been generally referred to exudation from the capillaries of the bronchial membrane. I believe that at present it is too exclusively imputed to this source; and that, although this is much the most common mode of its production, it not infrequently proceeds from an ulcerated or diseased vessel, particularly when the discharge is sudden, very copious, or rapidly fatal.—It has been supposed by some, that the blood is exuded from the general surface of an ulcerated cavity, when this lesion has preceded the discharge. This may possibly be the case in a very few instances; but, when the cavity is the seat of hæmorrhage, one vessel or a few only, are most likely its source. In most of the cases of hæmorrhage, in connection with cavities in the lungs, that I have seen, the internal surfaces of these cavities, or fistulous ulcers, appeared not in a state indicating that hæmorrhage either had, or could have, taken place from them. The circumstance of the small bronchi being filled with blood, or their membrane being deeply tinged, or even injected or inflamed, is no proof of the discharge having taken place from them, as the blood, when once effused, even as high up as the trachea, will frequently gravitate or pass downwards into the minute air-vessels, especially when the lungs are in a state of disease or of debility, and will discolour, irritate, or even inflame them.*

111. J. P. FRANK has endeavoured to establish variety of hæmoptysis under the denomination of tracheal, from its seat. Admitting the occasional occurrence of hæmorrhage from this situation, it rarely can be distinguished from other states of the disease, even with the aid of percussion and of auscultation; for, as this very able and practical writer has shown with great truth and originality, a considerable portion of the blood effused in this situation passes down into the bronchi, and gives rise to the same phenomena as depend upon the more common forms of the malady. This, however, he concedes. In cases, also, of profuse hæmorrhage from the pharynx or parts adjoining, a portion of the blood may escape into the trachea, descend into the bronchi, and afterwards be coughed up, thereby simulating hæmoptysis. The blood may thus pass into the lungs as well as into the stomach (§ 91. 99.), and may either be coughed up, or both coughed or vomited up, thereby simulating true hæmoptysis; or, if the quantity be great, it may suffocate the patient. Dr. WARSON mentions a case which he saw, in which suffocation occurred from the passage of blood into the respiratory passages, from an ulcerated opening into one of the lingual arteries, the bronchi containing a considerable quantity of this fluid. From the foregoing, therefore, it may be inferred, that the blood in true hæmoptysis proceeds from one or other of the following sources:—1st, From the mucous membrane of the bronchi—*Bronchial hæmorrhage*.—2d, From the substance of the lung, constituting the pulmonary apoplexy of LAENNEC, or, more correctly, *Pulmonary Hæmorrhage*.—3d, From an ulcerated or tuberculous cavity, one or more vessels having been eroded or ruptured.—4th, From aneurism of the aorta, or of some other artery.

112. D. *Certain Pathological Relations of Hæmoptysis* have been very generally overlooked by writers on this and other pulmonary diseases.—1. The intimate connection, however, existing between it and *tubercles in the lungs* has been very diligently investigated by LOUIS, ANDRAL, and others. ANDRAL refers to cases of hæmoptysis in which there appeared to be no evidence of the previous existence of tubercles in the lungs. Such cases are rare, and are to be referred chiefly to extreme congestion of the lungs. Instances are certainly not infrequent, of the hæmorrhage occurring in a state of apparent health; but, in many of these, tubercles in an early stage of their existence may have previously been formed, or even have been detected upon close examination.

in bronchium ruit; ex hoc, in alia, vicina, altiora, assurgit; ex istis, per ramos bronchiorum laterales, decelives, in subjectam pulmonis affecti, aut etiam in sani, substantiam descendit, ac novo reflexu, sub summis anxietatibus præcordia sensu, violenta diaphragmatis actione, sed interdum sine tussis manifesta, et per solam quasi expirationem fortorem, torrensque adinatar, per tracheam, laryngem, per oris, et narium per os, tam fluidus ac foetidus, quam partim concretus, obscurus, horrendo spectaculo præcipitat. Sub tanto cruore ad fauces impetu, pars elue, in pharyngem recurrit, nonnullum, ut vidimus, violentum sæpe provocat, elisquæ, forsitan ventriculo contentos, novæ sanguinis undæ, per tracheam simul expulsa, commotæ, expellit, ac validum medicum, tussis ipsam aliquando per vomitum cruentum excitatæ, non ignaro, quo demum ex cavo sanguis scaturiat, dubitandi argumentum relinquit. Hæc dubia non minus in casu, quo tussis violenta prævit, ac, letius ob impetum, sanguis non modo pulmonum, sed simul narium et vasæ expellitur, urebunt; aut facile pulmo, ob nares cruentas, profuvili insons, cum magno iudicii errore, declarabitur. De Curand. Hom. Morb. 6. class. v. ord. lii. gen. 3. § 606.

* This, as well as other points connected with hæmoptysis, are very justly stated by the elder FRANK:—"Si medius, et ex vasæ conplevis, majore cum impetu cruor

BAILLOU remarked that profuse hæmorrhage from the lungs is less dangerous than small, and there is much truth in the observation; but PORTAL went too far in saying, that those who habitually spit blood are rarely phthisical. My own observation is more in accordance with that of LOUIS, who states that, with the exception of some cases in which hæmoptysis depends upon external injury, or is connected with suddenly suppressed catamenia, it indicates with very great probability the presence of tubercles in the lungs. Dr. JAMES CLARK, in his able work, observes that hæmoptysis is occasionally idiopathic, or dependent upon a temporary plethora or congestion of the lungs, especially when it is a consequence of suppressed sanguineous discharges. In tubercular phthisis, congestion of portions of the lungs, or even of the whole of the organ, is not infrequent, and is, in many cases, followed by a more or less copious hæmoptysis. Such congestion may also develop tubercles, or hasten their progress, as well as occasion the effusion of blood. In some instances the discharge will afford relief to all the pulmonary symptoms, especially when the effused blood is entirely thrown off; but, in others, it will accelerate a fatal issue, particularly when a portion of it remains in the bronchi, and irritates them, as shown hereafter (§ 114.).

113. It has been supposed by ANDRAL and others, that hæmoptysis occasionally is a cause of phthisis, the blood effused into the lungs forming a matrix for tubercular deposits. But to produce this effect the effusion must take place in a scrofulous constitution. I agree, however, with Dr. JAMES CLARK in considering hæmoptysis rarely to be a cause of phthisis, unless by the debility it induces when very copious, or by the depletion employed to suppress it; or still more probably by the irritation produced by the effused blood in the minute bronchi. It is a frequent symptom during the whole course of phthisis, and may appear at any stage. LOUIS states that it was present in some degree or other in two-thirds of his cases. It is rare in the phthisis of children and old persons, and occurs generally towards the close of the disease.

114. b. The connection between hæmoptysis and inflammation of the lungs, has been very generally overlooked. The former occurs in very rare cases as a termination or crisis of the latter; but when the inflammation is associated with tubercles, the development of these is frequently promoted by the hæmoptysis. One of the most common consequences of hæmorrhage into the bronchi is inflammatory action. The effused blood irritates the mucous membrane of the bronchi, especially in the minutest ramifications, and the morbid action often extends to the air-cells and substance of the lungs. This is very frequently observed in weak and susceptible constitutions, and when the effused blood has been imperfectly excreted from the bronchi. The softening and discolouration of the bronchial surface, generally seen in fatal cases of hæmoptysis, arise from this consecutive inflammatory irritation; and the puriform matter sometimes poured into the bronchi, with or without fibrinous concretions, or a coloured lymph, proceeds from the same source. A part, doubtless, of the fibrinous matters arises from the effused fluid; but a part also consists of the lymph given out by the capillaries, which

had shortly before discharged blood. — In all cases, therefore, of hæmoptysis, it is not merely the development of accelerated progress of tubercles which is to be dreaded, but also the supervention of circumscribed or diffused pneumonia, which may assume any of the forms described in *Inflammation of the Lungs*.

115. c. The relation of hæmoptysis with disease of the heart has been already alluded to. The momentum caused by hypertrophy of the right ventricle is rarely sufficient to rupture any branch of the pulmonary artery, although it may probably overcome the resistance opposed by the tonicity of the extreme capillaries in the bronchial surface, or in the substance of the lungs. Dr. WARSON, who has taken a very sound view of this, as well as of some other subjects connected with hæmoptysis, states that every instance of pulmonary hæmorrhage dependent upon organic disease of the heart which he had observed, coincided with disease on the left side of that organ, mechanically obstructing the return of blood from the lungs. The obstacle has sometimes been placed at the entrance of the aorta, but it has most commonly consisted of narrowing of the left auriculo-ventricular orifice, and a rigid condition of the mitral valve. Facts illustrative of this relation have also been adduced by Dr. WILSON (*Med. Gazette*, vol. vi. p. 25.), and observed by myself. I believe, moreover, that those powerful mental emotions, which affect suddenly the functions of the heart — which seriously disturb its action and favour congestion of its cavities, as terror, fear, anger, grief, &c. sometimes produce hæmoptysis by impeding the return of blood to the right side of this organ.

116. B. Other complications beside the above occasionally present themselves in practice; but, in these, hæmoptysis is merely a symptom, arising from some predisposition to pulmonary or hæmorrhagic affections. — a. It has been stated that bronchitis and pneumonia often follow hæmoptysis, and the reason has been assigned (§ 114.). But the complication of acute or sub-acute pneumonia with slighter forms of this disease, has been very generally overlooked, especially by recent writers. STOLL and BROUSSAIS, however, have remarked that hæmoptysis sometimes accompanies, or is an accidental symptom of, pneumonia. The remark is just. Care, therefore, should be taken to recognise this state, as well as to distinguish between both diseases; as the use of astringents, on the supposition that the patient is suffering the former affection only, might lead to fatal results. Even with the aid of auscultation, the existence of the pneumonia may not be ascertained, as the auscultatory signs may be ascribed to the infiltration of the bronchi, or of the substance of the lungs, with the effused blood, or to the attendant congestion. The rational symptoms in this case should be carefully weighed; and where there are dyspnoea, cough, oppressed or quick breathing, heat of skin, a hard or full pulse, deep-seated pain in the chest, crepitant rhonchus and bronchial respiration, present, the disease should be viewed as inflammatory, the hæmorrhage being merely a contingent symptom or complication. Even when the hæmoptysis has originated in tubercles, inflammation of one or more lobes of the lungs may also exist, and may implicate not only the substance of the organ,

but also its pleura, giving rise to albuminous exudation, and adhesions to the costal pleura. I have not infrequently found, upon dissection of cases of hæmoptysis, not only tubercles in every stage of their progress and results, but also inflammations of the substance of the lungs, and of the pleura*, with all the structural consequences, and yet, in some cases, no pain had been felt so severe as would have directed attention to an affection of the pleura.

117. *b.* It is not unusual to see hæmoptysis in the course of severe *hooping cough*, especially when this latter disease affects persons near, or after, the period of puberty. In children the hæmoptysis is generally slight; but in grown-up persons it is often a dangerous or fatal complication of hooping cough. — *b.* It is occasionally observed as a consequence of *enlargement or congestions of the liver and spleen*; these affections in some measure causing the pulmonary hæmorrhage, by deranging the circulation through the lungs, or heart, or both. In most of such cases the functions of the heart are intermediately disturbed. Where the hæmoptysis is consequent upon hæmorrhoids, obstructions of the liver may be anticipated. This connection has been noticed by BAILLOW, MORGAGNI, STOLTI, LANDRÉ BEAUVAIS, and others. SAUVAGES makes very particular mention of the occasional dependence of hæmoptysis upon enlargements of the spleen. The connection between hæmoptysis and hæmorrhoidal affections is generally one of sequence rather than of association; the former following the latter, or sometimes occurring after operations for these, or for *fistula in ano*. The connection with *amenorrhœa* is generally that of cause and effect; but the pulmonary disease and the attendant hæmorrhage more frequently give rise to the suppression of the catamenia than this latter occasions the hæmoptysis. — *c.* Pulmonary hæmorrhage has also, in rare cases, appeared in gouty persons, or in connection with irregular or misplaced *gout*. In these, calcareous concretions have sometimes been expectorated with the blood, or have been found in the lungs on dissection. — *d.* The symptomatic occurrence of hæmoptysis in the course of *measles*, of *putro-adyamic fevers*, of *scurvy*, *purpura*, and pestilential diseases, requires no remark.

118. *iii.* DIAGNOSIS. — It will often be difficult to determine whether or not the blood discharged

proceeds from the bronchi, or from the nares, throat, pharynx, or stomach, owing to the circumstances insisted upon in other parts of this article (§ 91. 99.). The remarks there made, in illustration of this, render it unnecessary to enter much further into the subject. — *a.* When the blood is florid, frothy, or contains bubbles of air, or is mixed with muco-puriform matters, then all doubt will be removed. The history of the case, and the premonitory and attendant phenomena, are generally such as to remove all difficulty, unless when the patient has been previously in good health, or when the blood is of a dark hue, or when a large portion of it has been swallowed, and is thrown up by vomiting. In these cases, it will very commonly be found upon auscultation that blood is present, either in the large bronchi, causing a bubbling rattle, or in the small ramifications, with loss of the respiratory sounds, and with dulness on percussion. Phthisical indications, also, referrible to the constitution, have generally preceded the attack; and symptoms of disorder of the respiratory organs have ushered it in, and accompanied it.

119. *b.* When the accumulation of blood in the *pharynx* from the fauces or adjoining parts excites cough, or escapes into the trachea or bronchi, the difficulty of determining with precision the source of the discharge is generally great. In these the practitioner will be guided chiefly by the state of the patient just before the attack, and by the premonitory symptoms. The absence of disease within the chest, as indicated by auscultation and percussion, an attentive examination of the mouth and throat, and a close observation of the phenomena attending the discharge of blood, will greatly assist the diagnosis (§ 91. 99.).*

120. *iv.* PROGNOSIS. — Hæmoptysis is always a serious disease, and attended by danger in most circumstances. This character, however, does not so much depend upon the hæmorrhage, as upon the pathological state or lesion, of which it is the consequence. The opinion as to the result will, therefore, be chiefly formed from the inference as to its source. Wherever there is any obvious sign of tubercular disease, and when dyspnoea or pulmonary symptoms have preceded the attack, a most unfavourable prognosis should be given. The question merely relates to the period which may elapse from the occurrence of hæmorrhage to a fatal termination; and this will depend much upon the season, upon the progress of the pulmonary lesions, and various other circumstances. — The cause of the disease should also be taken into consideration, and the pathological states which complicate the hæmorrhage. When there is reason to infer that venereal excesses, and more especially solitary venereal vices, have induced the malady, as they very frequently do, we may infer that tubercles have preceded the attack; and should consequently form a most unfavourable prognosis, especially when the diathesis is obviously scrofulous or hæmorrhagic. The circum-

* As the article was going through the press, a boy, aged 15, of a scrofulous diathesis, who had been long under my care with tubercular phthisis, died with profuse hæmorrhage from the lungs. Excavations in this organ, with accretion of the pleura, had been recognised some months before his death. He had not complained of pain in any part of the thorax. The body was examined in my presence by Mr. HERBERT BAKER, twelve hours after death. Numerous cavities with thick linings were found dispersed through both lungs; the small intervening spaces being studded by crude tubercles. Each lung contained between thirty and forty ulcerated cavities, varying from the size of a bean to that of a large orange; those on the right side being the largest, and from this side the hæmorrhage had taken place. The cavities on the left side were filled by pus of various colour and consistence. Those on the right were filled chiefly by coagulated and fluid blood, the latter mixed with pus in some places. The right pulmonary pleura was so firmly adherent to the costal and diaphragmatic pleura, that this lung could not be removed from the chest until all the costal pleura was removed from the parietes to which it was attached. In this case the heart participated, in its unusual atrophy, in the extreme emaciation of the body. The stomach, as in many cases of profuse or fatal hæmorrhage from the lungs, contained a large quantity of blood, thus illustrating the statements

* PAULI'S *EGIPTICA* remarks, that if the blood be frothy and light, it comes from the trachea; but if it be black or grumous, and if there is pain in the part, it is from the thorax. If it is brought up by hawking, it is from the palate or parts about the pharynx. If it flow from the head, it is evacuated with tickling and cough, for it runs down into the windpipe, and is again brought up; such discharges being generally preceded by an acrid defluxion, and by headach or heaviness. (i. lib. ch. 31.)

stance of the patient not being alarmed by the attack, but flattering himself with the hopes of recovery; should be taken into account, as recommended as early as ARÆTÆUS. The dependence of the effusion upon disease of the heart, especially upon narrowing of the left auriculo-ventricular opening, is, perhaps, not a much more favourable circumstance than the connection with tubercles.

121. A more favourable, but still a guarded, opinion may be given, when the attack seems dependent upon inflammatory determination to the lungs, or on active congestion, or upon general plethora, when the indications of pulmonary disease, or of constitutional fault, are not present; and when the attack has been produced by external violence, or by mechanical injury. If it have arisen from suppressed catamenia or hæmorrhoids, or in connection with congestion or enlargement of the liver or spleen, a similar opinion may be formed, unless the indications of pulmonary disease are manifest; but when the disappearance of these or of other evacuations are evidently the consequence of the disease in the lungs, and of which the hæmoptysis is merely a part, the prognosis should be as unfavourable as in the circumstance above noticed. When hæmoptysis appears after the operation for fistula, particularly when the fistula has been connected with pulmonary symptoms, as it often is, the result may be surely predicted.

122. In every case of hæmoptysis, the opinion should partly depend upon the symptoms immediately preceding the seizure, and upon the frequency and state of the pulse both during and after the discharge; due allowance being made for the alarm caused by the occurrence. If the pulse becomes quick and sharp, the breathing short or oppressed; if symptoms or signs of inflammatory action in the lungs or pleura exist or supervene; if a large portion of the lung cease to be traversed by the air; if the expectoration be puriform, or rusty, or offensive; and especially if a cavity be detected in the lungs, and particles of softened tubercular matter appear in the expectoration, a fatal result should be expected.

123. v. TREATMENT.—A. ARÆTÆUS and PAULUS ÆGINETA recommend that the patient be laid upon a couch in a cool place, with the head elevated; and all physical and mental excitement, and talking, or strong respiration, should always be carefully avoided. As to the means of cure, CÆLUS, GALEN, AËTIUS, and ALEXANDER are tolerably agreed. ARÆTÆUS, ORIBASIVS, ACTURIUS, and NONNUS, advise bloodletting in most cases, ligatures on the extremities, and astringents internally and externally. A similar practice is advocated by CÆLIVS, with the addition of cold drinks. SCRIBONIUS LARGUS and OCTAVIUS HORATIUS direct the chest to be sponged with vinegar. GALEN remarks, that cooling astringents often have a different effect from that which they are intended to produce; that they occasion determination of blood internally, and congestion of the deep-seated veins; and that he has seen persons with hæmoptysis injured by the application of cold to the chest. He, therefore, does not approve of the indiscriminate recourse to astringents and to cold. CÆLIVS AURELIANUS recommends the application of cold water and vinegar, or other astringents, to the thorax, and bleeding, general or local, or both, if pain, dyspnoea, or a

dry cough be present. He gives, internally, gum with alum, and decoction of poppies, vinegar, and electuaries with opium, frankincense, &c. He decides in favour of the disputed practice of applying ligatures to the extremities. Similar remedies are advised by PAULUS, with the addition of austere wine and fruits. Amongst the latter, the pomegranate is particularly mentioned. MANICELLUS directs nearly the same means, with the exception of ligatures. DIOSCORIDES, PLINY, GALEN, ALEXANDER, PAULUS, and most of the ancients prescribe the hæmatite, or blood stone, which contains oxide of iron.

124. The Arabian writers supply very little information respecting the treatment of hæmoptysis, beyond what is contained in the works of the Greeks. AVICENNA, who is very full upon the subject, approves of the internal exhibition of vinegar, and of anodynes, as mandragora, henbane, and poppy, for the relief of cough. AVERROES condemns the use of vinegar; but RHASES and SERAPION advise the chest to be sponged with it. MESUE prescribes chalybeate waters for drink, and astringents. HALY-ABBAS endeavours to adapt the treatment to the forms of the disease. In the hot (the active) variety, he directs bleeding from a vein, and the repetition of it, if required, purging with mild medicines, and the combination of demulcents with poppy. When the disease arises from a cold cause (passive), he prohibits venesection and prescribes stimulants—as frankincense and myrrh, and, in some cases, tonic astringents—as galls, sumach, alum, &c., with astringents applied to the chest. ALSAHARAVIUS approves of bleeding, cold applications to the thorax, opiates and astringents, with a milk diet. RHASES agrees with this practice, but guards against the indiscriminate application of cold to the breast. MR. ADAMS, in his interesting remarks (*Trans. of PAULUS ÆGINETA*, p. 412.), states that cold applications to this part are not now generally resorted to; yet a practitioner lately acquired great celebrity for curing hæmoptysis by sponging the chest with vinegar. I have been called to two or three cases, for which cold epithems had been most assiduously employed; but they were injurious, and evidently increased the pulmonary congestion and all the pectoral symptoms. VAN SWIETEN is favourable to the internal and external use of cold water in this disease; but I am confident that sponging with vinegar will be found more serviceable and more generally appropriate than a prolonged application of cold.

125. B. From the brief view now exhibited, it will be seen that but little progress has been made in modern times in the treatment of hæmoptysis; and that this progress has reference chiefly to the more appropriate use of the means, which were known to the ancients as well as to the moderns. Much, however, will depend upon the decision with which they are prescribed and carried into effect. Upon seeing a patient attacked by hæmoptysis, the physician will frequently find him alarmed; and the consequences of such alarm may be mistaken for the state of the constitution, or the effects produced by the disease. This and various other circumstances must be taken into consideration, and a determination as to the measures to be adopted, in order to arrest the hæmorrhage, promptly formed.

126. a. The clothes should be removed or loosened

from the upper part of the body, and the patient ought to be seated upright in a chair, in order to facilitate the discharge of the blood from the lungs. In a recumbent, or even reclining posture, the blood will more readily pass along the bronchi, and fill the smaller ramifications, than when the chest is erect, and its movements during respiration unimpeded. If the patient be robust or young, if he have not suffered long from pulmonary disease, and if the hæmorrhage has not been very great, *bloodletting* ought to be immediately performed in the arm from a large orifice, until an impression is made upon the pulse, or faintness ensue. Whilst the blood is flowing, the bared chest may be sprinkled with cold water, or sponged with vinegar; and any astringent the earliest procured, as vinegar slightly diluted, may be taken internally. — The quantity of blood to be abstracted, and the repetition of the operation, must entirely depend upon the effects produced by it, and the judgment of the practitioner; but he will be guided in this by the constitution and state of the patient, by the indications of active congestion, or inflammatory determination, by the continuance and violence of the hæmorrhage, by the antecedent symptoms, and by the information he may obtain as to the causes and pathological relations of the seizure. If the patient be delicate, or enfeebled by previous disease, or if the hæmorrhage has continued so long as to render venesection a hazardous measure, or if bloodletting has been already resorted to, or repeated, *cupping* should be substituted. Where further abstraction of blood, even by cupping, cannot be ventured on, *dry-cupping*, as advised by HIPPOCRATES and most of the ancients, and in modern times by HORNÉ and WEIDEMANN, ought to be adopted. When the least delay may increase the danger, it may be very efficiently and promptly performed with some common beer glasses, or other similar means, several being applied, either between the shoulders or upon the breast. I have often used dry-cupping, in addition to venesection, with marked advantage; sometimes covering the back and shoulders by the substitutes just mentioned. If the hæmorrhage be connected with suppression of the catamenia or hæmorrhoids, the feet should be plunged in warm water, and a vein opened in each foot. If the hæmoptysis is moderate, a number of leeches may be applied to the tops of the thighs, or around the anus. The derivation produced by these means, and the effects of the latter in restoring the suppressed discharge, should not be neglected. CÆLUS advises cupping to be performed in these situations, especially when the disease is thus associated.

127. *b.* It often happens, when hæmoptysis ceases, after a small or a single bloodletting, or when the pulse rises in strength and frequency, that the hæmorrhage returns in one, two, or three days, or after a longer interval. This mostly occurs in young or plethoric persons, where the discharge is connected with congestion of the lungs, or when the first attack has been slight, and the venesection sufficient merely to give a greater freedom of vascular action, without removing the pulmonary congestion or determination. In these cases, bloodletting should be repeated, in order to prevent a renewed attack, especially if the pulse rise after the first depletion, and if signs of inflammatory

action in the lungs or bronchi appear. The patient should be carefully watched after the first discharge, and daily examined by the stethoscope and by percussion; and, upon the first indication of returning hæmorrhage, or of supervening inflammation, blood ought to be taken away in one or other of the modes just stated, according to the peculiarities of the case.

128. Where the antecedent disease, the quantity of blood discharged or removed by venesection, and the manifest asthenia from these or other causes, forbid further depletion, recourse must be had to *derivatives*, *astringents*, and *sedatives*, generally simultaneously or in combination. Indeed, even in those cases which evince increased action, and require decided or repeated depletion, these, as well as refrigerants, ought to be brought as early as possible into simultaneous or successive action. The feet and hands ought to be plunged in warm water; and, if venesection be not performed in the former situation, mustard or salt, or both, should be added to the water. An enema with an ounce, or an ounce and a half, of spirits of turpentine, should be administered forthwith; and other means appropriate to the case prescribed. But as to these means, much difference of opinion will necessarily exist. The internal use of astringents is generally adopted; but those usually employed can have little effect, excepting in slight or protracted cases; and even powerful astringents taken into the stomach will have little or no influence upon the bleeding part before a number of hours have elapsed. From observing the rapidity with which oil of turpentine is absorbed, and passes off by the kidneys and lungs, I have been induced to employ this medicine in preference to others as an astringent in hæmoptysis; prescribing it in small or large doses, according to circumstances, and as it seemed desirable to act at the same time more or less decidedly upon the bowels or kidneys.

129. In advising sponging with vinegar and rose-water, or sprinkling cold water on the breast, I had especial reference to the sympathetic influence these may have upon the bleeding surface, and the reaction in the skin which they subsequently occasion, especially when they are also applied to the face. When these means have not succeeded, I have, on several occasions, prescribed rubefacients, instead of cold applications, to the chest; as these last are more frequently injurious than beneficial in such cases. An epithem, with oil of turpentine, either tepid or warm, allowed to remain on the breast, or between the shoulders, until it occasions a burning sensation and redness, is the rubefacient I have preferred, as the quickest in its operation, and the most conducive to the removal of congestion or of inflammatory action. The vapour also of the turpentine is diffused around the patient, and being inhaled during inspiration, assists in constricting the vessels of the bleeding surface. Where there appears any objection to this application, a *sinapism*, or a piece of flannel soaked with either of the *liniments* (F. 296. 311.), may be placed upon the chest. *Blisters* may also be resorted to. I agree with LENTIN, RANOE, and PERCIVAL, in the propriety of applying them to the back or between the shoulders.

130. *c.* Besides the above means, others may be employed; the practitioner being guided in his selection by the peculiarities of the case, and ea-

pecially by the previous treatment, by the state of vital power and vascular action, and by the presence of cough and febrile symptoms. It should be kept in mind, that the sooner the hæmorrhage is arrested, the least likely is infiltration of the bronchi and its consequent evils to take place; and that, whilst this—the first indication of treatment—is receiving attention, the accumulation of the effused blood, and the consecutive effects upon the bronchi and lungs, and through them upon the system, ought to be prevented as far as possible.—The treatment already described, with reference to hæmorrhage in general, is, in great measure, appropriate to hæmoptysis, according to the principles of its application already advocated. Most of the information that will be here conveyed may be viewed chiefly as suggestions, which the practitioner will receive or reject, as he may deem proper, or which he may apply to practice as the features of the disease may warrant. He ought, however, to be impressed by the fact that, however high vascular excitement may appear, vital tone is more or less impaired; that in proportion as tone becomes diminished, so will the tendency to infiltration of the bronchi or lungs with the effused blood, and to capillary congestion of them, be increased; and, consequently, that vascular depletions and other vital deprivements, although often requiring promptitude and decision, should be employed with discrimination and caution.

131. *d.* Of the various *astringents* recommended in hæmoptysis, the *acetate of lead*, conjoined with opiates or other sedatives, as advised by REYNOLDS, LAITHAM, DAVIES, VALENTIN, AMELUNG, and others, is one of the most deserving of adoption. It may be given more freely than has generally been done, as shown by Dr. A. T. THOMSON, if it be conjoined with acetic acid, this acid being itself one of the best remedies when taken in sufficiently large quantity. Of this the ancients were fully aware, as it was employed most liberally by them. The *mineral acids* appear to be preferred by HENNING, DOEMLING, HALLER, JOERDENS, LOEFFLER, SCHULZE, and others; and by most of the moderns. I have, however, seen the liberal use of common vinegar more efficacious than these; and it is more generally congruous with the other remedies usually employed. Indeed, where the acetate of lead is given, the mineral acids will either neutralise its effects or prove injurious. The *gallic acid*, dissolved in water, or in ether, or in alcohol; and the powder or tincture of galls may be mentioned. RUSPINI's styptic is supposed to be a solution of this acid in ether or in spirit; and may also be tried, on account of its reputed efficacy.* Of other astringents, little additional mention need be made. They are sometimes useful in the more adynamic states of the disease, or after large losses of blood, or copious depletions. When debility is urgent, those which are most tonic may be selected, as the tincture of the muriate of iron; the sulphates of iron, or of alumina, or of zinc, or of quinine—the two latter in the infusion of roses with sulphuric acid; and the vegetable astringents, as catechu, kino, uva-ursi, extract of logwood,

rhatany, pomegranate bark, &c. The mineral acids, as well as the other astringents, may be conjoined with opium or other anodynes.—A strong solution of alum, and alum whey, for common drink, have been very generally employed by both ancients and moderns.

132. *e.* *Refrigerants* are required in the more febrile and active states of the disease, as adjuvants, chiefly of depletions, and other antiphlogistic remedies. They are further beneficial by acting upon the kidneys. *Nitre*, in considerable or frequently repeated doses, is recommended by GIBSON, DICKSON, HARTMANN, HUFFLAND, and many others. It is much used by the Italian physicians, in large doses, conjoined with demulcents. They give from three to six drachms in twenty hours. It is also beneficially associated with camphor, the acetate of ammonia, and sweet spirits of nitre (F. 95. 294. 747.), or with the *boracic acid* (F. 644.), and with conserve of roses. The *muriate of ammonia* is equally serviceable, especially in the more passive states of hæmoptysis, when it is advantageously conjoined with muriatic acid (F. 864.). LENTIN advises it to be taken in half a drachm every two hours, with an equal part of extract of liquorice. The internal use of ices, or of iced fluids, has been advocated by many writers. But, like all other active means, they require discrimination. In the passive states of the disease—where asthenia is apparent, the circulation languid, and the temperature not much above the natural standard,—they are injurious.

133. *f.* *Alvine evacuations* are serviceable, by removing morbid matters and obstructions to the portal circulation, and by deriving from the seat of hæmorrhage.—*Purgatives* ought, therefore, never to be neglected; and, unless when the hæmoptysis is so abundant as to be alarming, they should precede, or be alternated with, astringents; or such of these latter as will not confine the bowels ought to be selected. The exhibition of an *emetic*, previous to the purgative, has been advised, especially by STOLL, DARWIN, FLENOIX, RANOE, DOEMLING, PAULINI, and SCHMIDTMANN; whilst FRANK and some others think them hazardous. When the hæmorrhage has been already copious, or after bloodletting has been resorted to, an emetic of ipecacuanha, or of sulphate of zinc, or of a combination of both, is serviceable, not only in aiding the arrest of the effusion, but also in evacuating the blood accumulated in the bronchi, and thereby preventing the ill effects which this fluid would produce if it were allowed to remain. It is not merely the vomiting caused by an emetic which is beneficial, but the effect which is produced upon the heart's action. It is with reference chiefly to this latter operation—to its contra-stimulant action—that emetics and *nauseants* have been recently employed on the Continent, especially in Italy, and by LAENNEC and others in France. In the passive or asthenic forms of the disease, *nauseants*, especially the tartar emetic, may be injurious—even in the same case, wherein an emetic of sulphate of zinc might prove of service. As to *purgatives*, the neutral salts, with an excess of acids, as the sulphates with sulphuric acid in infusion of roses, or the supertartrate of potash, in the form of electuary, are the most generally appropriate—with the exception, perhaps, of oil of

* Dr. A. T. THOMSON states that this styptic consists of gallic acid, a small proportion of the sulphate of zinc, and of opium, dissolved in a mixture of alcohol and rose-water. This combination is judicious in most hæmorrhages.

turpentine, conjoined with castor oil.—These oils may be taken on the surface of an aromatic water or of milk, and be administered in enemata.

134. g. In exhibiting *anodynes*, the probability of their being injurious in the asthenic states of hæmoptysis should be recollected. When the powers of the system are inadequate to procure the excretion of the fluid effused into the bronchi, they ought to be given with caution, or in conjunction with tonic astringents, or with expectorants. *Colechicum* has been recently recommended, but it is only in the active states of the disease that it ought to be exhibited (F. 545.). *Digitalis*, however, is more generally prescribed. It is recommended by WITHERING, JONES, FERRIAR, HEUSINGER, VALENTIN, CARSON, HENRY, HORN, and others. It may be conjoined with astringents (F. 544.), narcotics, or other appropriate remedies (F. 514, 515.).—*Narcotics* are most serviceable when cough is urgent—by allaying the irritation, and diminishing the risk of the perpetuation or recurrence of the effusion from this cause. But when the hæmorrhage has ceased, and when breathing is difficult, the lungs congested, or the bronchi obstructed, by the effused blood, narcotics, especially in large doses, will only retard the discharge of the effused blood, and increase the mischief, unless they be conjoined with expectorants, as the senega, or benzoïn, benzoic acid, myrrh, assafoetida, the balsams of Peru or of Tolu, the terebinthinates, or camphor. In the passive states of the disease, or after large losses of blood, the balsams, both natural and artificial, especially those prescribed in the Appendix (F. 18—22.), are often beneficial. The balsam of LOCATELLI is very much employed in the Continent in hæmoptysis, and, from its composition, it seems very appropriate to most circumstances of the disease. The turpentine is the active ingredient, not only of it, but of the other artificial balsams prescribed in hæmorrhagic affections. The following is the usual mode of preparing it:—

No. 241. R Olei Olivæ ʒiij; Terebinthinæ Cerae flavæ, aa ʒiv; Pulv. subtiliss. Ligni Santali rubri ʒss. Ceram in Olei paulillo solve, dein reliquum, Terebinthinam, Lignumque Santali adde, et assidue move donec refrigerent.

135. h. There have been various other means recommended for the arrest of hæmoptysis, but many of them are not deserving of notice, and are therefore not here adverted to. The application of *ligatures* on the extremities was a disputed practice with the ancients, although most of them recommended them. J. P. FRANK and J. FRANK approve of them, and direct them to be placed high above the knees and elbows in such cases as admit not of bloodletting, owing either to the profuse hæmorrhage, or to constitutional adynamia. *Ipecacuanha* in small doses frequently repeated is praised by LOEFLER, HENNINGS, AASKOW, KECK, and NIEMANN; and by DE MEZA and HORN, conjoined with opium; the *secale cornutum*, by SPALANI, NEGRI, and RYAN; a strong solution of *common salt*, by PERCIVAL, DORMLING, MICHAELIS, and RUSH; the turpentine, by YOUNG, BOYLE, and ADAIR; and the *comfrey*, with aromatic sulphuric acid, by WENDT. With MARSHALL and numerous practitioners, mixtures containing nitre or alum, gums, and some one of the balsams, constituted the principal anti-hæmorrhagic remedies; and vascular depletions were prescribed. It cannot be doubted that

bloodletting is often unnecessarily directed in hæmoptysis, or carried too far; but in the active or inflammatory states of the disease, and when the discharge is scanty or small, it should not be neglected.

136. i. A few authors have questioned the propriety of arresting the effusion in certain circumstances. Dr. A. T. THOMSON remarks, that when the hæmoptysis "is not of an alarming character, and there is no obvious predisposition to tubercular consumption, especially if it be the consequence of a suppression of the menstrual discharge, it should only be moderated, not checked suddenly, which might induce a congestion in some organ less capable of supporting it with impunity." This is most dangerous doctrine; for, if the hæmorrhage be judiciously treated, the sooner it ceases in consequence the better. Hæmoptysis, in the circumstances stated by this writer, ought to be treated by depletions, derivatives, and other measures calculated to restore any suppressed discharge. The cases are very few in which there is no "obvious predisposition to tubercular consumption," and they are still fewer in which the suppressed discharge is the cause of the pulmonary disease; this latter, in either its more concealed or obvious states, almost always preceding, and even being the chief cause of, the suppression. It should be kept in view, that however moderate the hæmorrhage may appear to be, it is difficult to determine how far it may be attended by infiltration of the bronchi; and that the continuance of it, by filling these vessels, will risk the supervention of inflammatory irritation or action in them, and often also in the substance of the lungs and pleura; as well as hasten the development and progress of the tubercular productions.

137. k. The practitioner is not to rest satisfied with having fulfilled the first intention—the arrest of the hæmoptysis—his attention should immediately afterwards be directed to the removal of any blood that may have collected in the bronchi, and of whatever inflammatory irritation connected with it either costaneously or consecutively, that may exist. Where a crepitation is present, and is much diffused through the lung of one or both sides, more generally of one, fluid is present, and it is either a mucous lymph, or blood, or both, with more or less serum; the state of the expectoration indicating the proportions of either. But the blood may not be expectorated, or may undergo changes previous to expectoration, and clog up the bronchi and air-cells, and either perpetuate inflammatory action, or excite it anew. In the slight forms of hæmoptysis attendant upon tubercles, the effusion of blood is frequently one of the consequences of the inflammatory irritation existing in various parts of the bronchi, connected with impaired tone and congestion of parts of the substance of the lungs. Now, by what means is the above consecutive condition to be removed? When the attack has been treated actively, the more antiphlogistic means having been employed, and the lungs still remain embarrassed, manifestly from a portion of the effused blood, or from the fluid subsequently exuded, the exhibition of an emetic, and the repetition of it, as circumstances may indicate, will prove most serviceable. If febrile action; heat of skin, &c. be still present, then tartar emetic, *ipecacuanha*, or both, may

be thus employed; but when the vital powers are sunk, and asthenia is very prominent, the sulphate of zinc should be preferred. In cases characterised by relaxed, thin, or weak fibres, and general flabbiness of the soft solids—where bleeding would be injurious, *emetics* are frequently most beneficial.—They have been often advised in hæmoptysis; but the indiscriminate or inappropriate use of them, and the somewhat empirical recommendation of them by Dr. MARRYAT, have led to their disuse. I have, however, often prescribed them with great benefit. This writer directs two grains of tartarised antimony to be first given, and, as soon as nausea commences, two grains of sulphate of copper, dissolved in a little water. He deprecates blood-letting, and, after the sickness has gone off, gives twenty drops of the balsam of copaiba, night and morning, for several weeks, to prevent a return of the attack, and the size of a nutmeg of the following electuary, twice or thrice a day:—

No. 248. R. Pulv. Cinchona 3vj.; Sulphuris Sublimati 3ij.; Potassæ Nitratæ 3j.; Sulphureti Antimonii Præcipitati 3j.; Mucilaginis Acacim, q. s. ut fiat Electuarium.

138. I have no doubt of this treatment being quite appropriate to many circumstances of the disease; and, even in those cases where inflammatory action may supervene after the hæmorrhage has ceased, it may prove beneficial, especially if local depletion by cupping; external derivation by blisters, sinapisms, terebinthinated epithems or liniments, or by issues or setons; and suitable regimen, be employed. In order to fulfil the intention stated above, as well as to prevent the return of the hæmorrhage, the assiduous adoption of those external irritants, the internal use of the balsams or terebinthinateds (F. 18—22.), and an emetic occasionally, to unload the bronchi of accumulated fluids or mucosities, will prove most serviceable. At the same time, the digestive and excreting functions ought to receive due attention; and cough or irritation should be allayed by the combination of narcotics and sedatives, as conium, hyoscyamus, opium, &c.; and of emollients or demulcents, with the above, or other suitable medicines. When the hæmoptysis assumes a periodic form, which rarely is observed, the combination of the sulphate of quinine with alum or with sulphate of zinc (F. 597. 667.), or the Electuary just prescribed, according to MARRYAT, will generally prove successful.

139. 1. The inhalation of watery or medicated vapours has been recommended in hæmoptysis, and lately employed* by both rational and empirical practitioners. I have tried several substances, and in various combinations, through this medium. The practice requires much caution; but I think it will be found often of service if discrimination as well as perseverance be observed in respect to it. Towards the decline, or in the slighter forms of hæmoptysis, the more astringent substances may be used in this way, care being taken, that they neither occasion irritation or tightness in the thorax, nor excite cough. Those which I have tried in this state are—common vinegar, sometimes with a little camphor, or with a small quantity of turpentine; the pyroligneous acetic acid, kresote, and common tar. These were put in an inhaler with hot water, and the vapour inspired in the usual way; or in a large basin, and hot water poured upon them, and

the vapour allowed to diffuse itself around the patient. When a terebinthinated epithem, or liniment (F. 300. 311.) is used, the vapour from it will generally be sufficient. Some time after the hæmorrhage has ceased, the cautious adoption of this practice will be serviceable; and either these or other substances—as benzoin, assafoetida galbanum, myrrh, and other odoriferous resins, oil of aniseed—may be employed in this way, as directed in the article BRONCHITIS (§ 100.). In the more *asthenic forms* of the disease, when the expectation is copious, or is tinged with very dark blood, the diffusion of the vapour of the above substances in the air of the patient's apartment, and the taking of frequent deep inspirations, will frequently prove beneficial. If the patient evince indications of coexistent or consecutive inflammatory action, *emollient vapours* (see art. BRONCHITIS, § 76.), with the addition of the extract of conium or of hyoscyamus, or of stramonium, to the warm fluids employed for inhalation, will be extremely useful, especially if cough be severe.

140. C. The regimen during and after hæmoptysis is a most important part of the treatment. a. The ancients advised cooling beverages and diet. They allowed acid wine, and acerb or acid fruits. The pomegranate was much and deservedly praised by them, on account of its cooling and astringent operation. Glutinous and mucilaginous articles of diet were also recommended. All these deserve adoption. The principal question is, as to the diet which should be adopted. Dr. STEWART, some years ago, advised nourishing diet, cold sponging the surface, cold bathing, and exercise in the open air, and frequently with advantage. To persons of a relaxed habit, with a slow or natural pulse, and to those not suffering from febrile action, this plan is generally appropriate; very dilute acids, or lemonade, or common vinegar and water, being the usual beverage. He directed the whole surface of the body to be sponged in the morning; and the neck, breast, and shoulders at night, with tepid vinegar and water, gradually reducing the temperature to that of the surrounding air. After the sponging, frictions with flannel or the flesh-brush for half an hour were enjoined. Cold bathing and salt-water bathing were afterwards employed, and continued until recovery took place. Dr. STEWART advised this method in both febrile and non-febrile—in acute and chronic cases. In the non-febrile and chronic it is often serviceable, and, early in the febrile, it may also be occasionally useful. Sponging the surface, and assiduous friction immediately afterwards, are applicable to most cases; but the diet requires greater discrimination. Where fever is present, animal food increases the patient's ailments. In those, farinaceous glutinous, or mucilaginous substances only should be allowed, with goat's whey, stale butter-milk, grapes, raisins, the fruit of the carob or St. John's bean, asses' milk with Seltzer-water, &c.

141. b. The propriety of having recourse to repeated small depletions, or to a moderate blood-letting, about each equinox, in order to prevent the recurrence of hæmoptysis, has been insisted on by some writers, and when the effusion depends chiefly upon plethora or active determination to the lungs, the practice may be of service;

but when it occurs in the progress of tubercular phthisis, it may be injurious if indiscriminately adopted, although it may be of use in those cases in which subacute inflammatory action, or congestion of portions of the lungs, often complicate the tubercular formations, and occasion the sanguineous discharge. In the more asthenic states, depletions favour the progress of the tubercles, and are more or less injurious. The regulation of the excretions; the restoration of suppressed evacuations or accustomed secretions; occasional change of air; residence in a mild, humid, and equable climate; sea-voyaging; gentle exercise in the open air; flannel clothing next the skin; cold sponging the surface; acidulated drinks; light and nourishing food; mental quietude; and the avoidance of whatever depresses the vital powers, are severally productive of benefit: some of them ought not to be dispensed with. Exertions of the voice, playing on wind instruments, venereal indulgences, warm baths, and exposure to vicissitudes of the weather and season, ought always to be shunned. (See art. TUBERCULAR CONSUMPTION.)

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VI. HÆMORRHAGE FROM THE STOMACH.

SYN.—*Hæmatemesis* (from *αἷμα*, gen. *αἵνός*, blood; and *αἵματις*, vomiting); Linnaeus, Sagar, Vogel, Sauvages, Pinel, Good. *Vomitus cruentus, vel vom. sanguis, vomitio sanguinis*, Auct. Lat. var. *Hæmorrhæa ventriculi*, Swediaur. *Gastrorrhægia*; *Œsophagorrhægia*; *Morbis niger*; *Fluxus splenicus*, Auct. *Vomissement de Sang*, *Hématémèse*, Fr. *Blutbrechen*, Germ. *Vomito di Sangue*, *Ematemesi*, Ital. *Vomiting of Blood*.

* 142. **DEFIN.**—*A vomiting of a dark-red, black, fluid, or a semi-coagulated blood, sometimes pure, at*

other times mixed with aropy or watery fluid, or other matters contained in the stomach; preceded by nausea, oppression, tension or heat of the epigastrium, sometimes by faintness; unattended by cough; and frequently accompanied with very dark-coloured, grumous, or pitchy stools.

143. i. PATHOLOGY.—Like dropsy—of which it may be either an antecedent or epi-phenomenon—vomiting of blood is seldom an idiopathic or primary disease, but generally the consequence of certain pre-existing changes, sometimes chiefly seated in the stomach, at other times in the collious viscera, as the spleen, liver, or pancreas, and occasionally in some two or more of these organs. The blood may proceed from the mucous surface of the stomach, which is most commonly the case; and from the surface of the duodenum, or of the œsophagus. It is generally poured out from the congested, dilated, and weakened capillaries and exhaling pores of this surface; but it may be effused either from a limited part, or from a few small vessels chiefly, as when it depends on a congested or other morbid state of the spleen, or on ulceration, or from one or more diseased or ulcerated vessels, which latter is but rarely the case. It may proceed, also, from the rupture of an aneurismal tumour which has poured its blood either directly or mediately into the stomach; or, as supposed by some to happen in a very few instances, it may even flow along the ducts from the liver into the duodenum, from whence it may be partly regurgitated into the stomach; but this is extremely doubtful. The blood may, however, as shown above, pass from the posterior nares, or throat, or from the respiratory organs, into the stomach, and be afterwards vomited; and thus hæmatemesis may be closely simulated.

144. Besides these sources of the hæmorrhage, it is of importance to recognise the general condition of vital energy of the system accompanying it, as well as the state of action which the heart and arteries may evince. Hæmatemesis is attended with almost every grade of vascular action, from the lowest state of sub-action, to the most acute action; but more frequently the vascular system is deficient of vital tone, and this condition is extended, more or less, to all the soft solids of the frame. In a very great number of cases of this disease, also; we observe a state either of general cachexia, or of congestion, morbid function, or morbid structure, of more than one of the abdominal viscera.

145. Hæmatemesis is, more commonly than is generally stated by authors, a mode of termination, or a consequence, of inflammation, or of inflammatory irritation and congestion of the internal tunics of the stomach and duodenum, particularly when it presents signs of sthenic action, or is preceded by cardialgia, acute pain, tenderness, distension, and a sense of heat in the region of this organ, or when it occurs in young, plethoric subjects, and is caused by ingurgitation, by acrid matters received into the stomach, by the use of inebriating fluids, and by the suppression of accustomed discharges. In this inflammatory form of the disease, the blood thrown from the stomach is seldom in large quantity at one time, although frequently ejected, and is of less deep colour than in some other varieties; and that taken by venesection is usually cupped and buffed. I agree,

however, with QUARIN, RICHTER, FRANK, and SCHMIDTMANN, that this disease is more frequently accompanied with an asthenic, than sthenic, state of the vital powers.

146. It is of the utmost importance to appreciate fully the foregoing states, as upon them are chiefly based our opinions respecting the exact nature of the disease, and the most successful mode of removing it. In the following observations I shall notice—*first*, the primary and less complicated state of hæmatemesis; *secondly*, the supplemental, succedaneous, or vicarious forms of this disease; *thirdly*, hæmatemesis from disease of the viscera connected with the stomach; *fourthly*, hæmorrhage from certain organic lesions of the stomach, or of its vessels, and from complications with other diseases; and, *lastly*, that rarer form of hæmatemesis, which, from the colour of the ejected fluid, has been called the *morbus niger*.

147. A. Primary or Simple Hæmatemesis.—This form of the disease is entirely dependent upon the state of the mucous surface of the stomach, or upper portion of the duodenum. It may arise from a constitutional tendency to hæmorrhage, heightened in this particular part of the digestive mucous surface by some of the exciting causes of the disease, especially by an excessive use of vinous or spirituous liquors, or by both, and by general vascular plethora. It seems to be preceded by, and even to consist in, a more or less congested, weakened, or atonic state of the extreme venous capillaries arising in this surface, connected with similar states of this surface itself (see art. DIGESTIVE CANAL). But, conjoined with these states, there may exist increased action of the vessels supplying the bleeding surface. When it proceeds chiefly from the former of the conditions now referred to, there are generally appearances of deficient tone throughout the soft solids of the body. The blood ejected is dark-coloured, or grumous; and although there may be pain or tenderness of the epigastrium, there is no sense of heat, or sign of increased or sthenic vascular action.

148. When it depends more upon local determination, or increased action, arising from an irregular distribution of the vital energies with which the vascular system, or particular viscera, is endowed; or when it is consequent upon the state of inflammatory congestion referred to above (§ 145.), the vomiting of blood is either preceded by, or accompanied with, a frequent, soft, open, and sometimes small, pulse, by a sense of pain or tenderness, and of heat, at the epigastrium, with other symptoms of gastritis; and the blood thrown up is redder and more fluid than in the foregoing case, and seldom in very large quantity; but is sometimes mixed with portions of lymph, or with substances of a fleshy or fibrinous appearance. This particular state of the disease is often connected with a plethoric state of the vascular system, particularly of that part forming the portal system. When this obtains, the history of the case, the preceding causes, and circumstances connected with it, will assist us in forming a diagnosis. The patient generally is of a full habit of body, or he presents appearances of vascular plethora. The pulse is full, broad, and strong, and there is often fulness of the abdomen, particularly towards the epigastrium and hypo-

chondria, but without that degree of fulness, tumefaction, pain, or tenderness in the hypochondria, which attends upon serious disease of the spleen or liver, and which accompanies the third variety (§ 151.). This form of hæmatemesis in delicate constitutions, or in those predisposed to hemorrhagic disease, occasionally follows upon acrid or irritating substances taken into the stomach. Thus it has been produced by the irritation of an emetic, and by acrid poisons. WARTON, GLISSON, and HOFFMANN, have observed it occasioned by the use of irritating emmenagogues. It may assume a chronic, remittent, or periodic character. In two instances, in which it was occasioned by the daily excessive use of intoxicating liquors, it recurred every morning for several weeks; and, in one of them, was followed by a most violent attack of gout.

149. *B. Succedaneous or Vicarious Hæmatemesis.* — This form of the disease is not of infrequent occurrence. It is noticed by several authors, and particularly by BALLONIUS, HOFFMANN, FORESTUS, WHYTT, RIEDLIN, THOMANN, PINEL, and others, and has come before every experienced practitioner oftener than once. It generally arises from those causes which suppress suddenly, or prevent the return of, the *menstrual discharge*, or the *hemorrhoidal flux*. It may even replace an habitual *epistaxis*, or occur in females in the form of misplaced catamenia, this part of the uterine functions not having appeared. In the majority, however, of such cases, the hæmatemesis has been occasioned by some evident cause, and in its subsequent occurrence, it has assumed a periodic or vicarious form. This form may even manifest itself from the commencement, as where it has occurred instead of the catamenial evacuation, which has either not appeared, or been but imperfectly established.

150. From whatever cause this state of the disease may proceed, it evidently arrests or prevents the discharge the place of which it supplies; and, although it cannot be generally shown to depend upon previously existing disease of the stomach, or of the viscera intimately connected with this organ, yet we may suppose that the mucous surface and vessels of the stomach have been disposed to experience congestion, local determination, or the morbid conditions on which hæmorrhage has been shown above to depend. Possibly, also, the morbid states of the surrounding viscera may have been such as to assist in producing the hæmorrhage, although these states cannot be generally recognised, owing either to their slight extent, and the obscure or imperfectly developed phenomena attending them, or to our imperfect powers of observation. When hæmatemesis is consequent upon, or vicarious of, hæmorrhoids, particularly in aged or intemperate persons, a morbid state of the liver, as respects either its functions or its structure, as well as of the stomach, may reasonably be inferred, so far at least as to lead to an intimate examination of the state of this organ. Admitting the frequency of this morbid relation, we cannot, however, infer its constant existence, seeing that we often fail in detecting it, and of observing it after the hæmatemesis has ceased. It seems, therefore, more correct to infer that, in cases of this description, the sanguineous effusion is often a consequence of inflammatory congestion of the villous coat of

the stomach and duodenum, which has taken place more suddenly, and induced more rapidly the effusion than in some other forms of the disease.

151. *C. Hæmatemesis from Disease of the Viscera connected with the Stomach.* — The vomiting of blood in this form of the disease is *symptomatic* of congestion or structural change of the spleen, liver, or pancreas, or even of some other abdominal viscus. This is the most frequent form of hæmatemesis. A congested state of the stomach, and even also of the duodenum, being caused by obstructed circulation through, or other disease of, one or more of these viscera, any accidental irritation, or whatever increases the congestion on the internal surface of the stomach, may occasion the effusion of blood from it. Most frequently, perhaps, the hæmorrhage is produced by obstruction, enlargement, or some other lesion of the spleen, the anastomoses of the vessels of this organ with those of the stomach favouring its occurrence. When hæmatemesis arises from disease of the liver or spleen, the history of the case, the presence of fulness or tumefaction, tenderness or pain, in the hypochondria and epigastrium; symptomatic pains about the shoulders or shoulder-blades, an unhealthy or sallow state of the countenance, and chronic functional disorder of the stomach and bowels, will generally be observed. The discharge of blood in this form of hæmatemesis has sometimes acted as a critical evacuation, the symptoms of congestion of the liver or spleen, or of both, which had existed, having been removed by it, and health restored. Instances of this kind have been recorded by DE HAEN, FRANK, PORTAL, PINEL, SCHMIDTMANN, and others, and have occurred to myself, particularly in persons who had suffered long from ague. More frequently, however, the hæmorrhage has furnished only a temporary advantage, the disease of the liver or spleen, which it had relieved, again returning, followed by an attack of hæmatemesis and another period of relief; or terminating fatally, dissection disclosing the extent of the disease of which the hæmorrhage was merely a symptom. In this variety, the blood thrown up is generally of a dark colour, and either fluid or grumous, and consisting of small coagula. The stools are also morbid — frequently black, pitchy or grumous, loose, and very offensive. The hæmorrhage is often preceded by, complicated with, or followed by, dropsy of the abdomen, or of the lower extremities, or both; but rarely with hydrothorax, unless it have followed the effusion into the peritoneal cavity. In some instances, obstinate diarrhoea or dysentery has supervened, especially in warm or miasmatic climates.

152. I agree with TRALLÉS (*De usu Opil*, vol. ii. p. 29.), who has strongly insisted on the frequently active or sthenic state of the vessels in hæmatemesis, that, in the preceding forms, the impeded or obstructed return of blood through the veins frequently occasions an augmented action of the arteries; and, as the blood cannot pass in sufficient quantity, or with requisite celerity, by the veins, that it is determined with greater impetus into the extreme arterial capillaries, thereby dilating their exhaling pores, and being effused into the cavity of the organ. Some degree of vascular reaction may also take place

on the villous surface of the stomach from this circumstance, giving rise to the membranous pieces of lymph which are sometimes ejected along with the blood, or subsequently.

153. *D. Hæmatemesis from Disease of the Coats or Vessels of the Stomach, and from other Maladies.*—The discharge of blood from the stomach may arise from ulceration having extended into one or more vessels; or from disease of the coats of an artery or vein, or from atheromatous or other deposits in the coats favouring their perforation or rupture. Such occurrences are, however, very rare. In a case of extensive and fatal hæmatemesis consequent upon scirrhus of the pylorus, in an aged man, attended by Mr. BYAM and myself, the arteries of the stomach were found studded by atheromatous deposits, and the coats of a considerable arterial branch were at one part destroyed by them, an opening from the interior of the vessel into the stomach having been detected after a minute examination. The effusion may even proceed from perforation and adhesion of the stomach to the liver or spleen, ulceration having extended to these viscera. It may also occur in an advanced stage of scirrhus ulceration of the pylorus or cardia; or from tumours, particularly those of a malignant character, in the parietes of the stomach; but in these cases the hæmorrhage seldom proceeds from the ulcerated part, or from the tumour, unless they be of a fungoid kind, the blood being exuded chiefly from the villous surface of the organ. Hæmatemesis may be also occasioned by any lesion causing hæmorrhage from the internal surface of the œsophagus, or from the bursting of an aneurismal tumour or varix in this situation as well as in the stomach itself. When the effusion takes place from the œsophagus, the blood generally passes in the first instance into the stomach, whence it is ejected with the contents of this viscus by vomiting; but it is sometimes eructated or gulped up without nausea or retching.

154. Blood is occasionally thrown off the stomach in the progress of continued fevers, particularly of those of an adynamic or putro-adyynamic form; and of those complicated with predominant disease of the stomach, liver, or spleen. It is also sometimes vomited in long-continued remittent and intermittent fevers, and more rarely in the exanthemata. Hæmatemesis has even ushered in severe attacks of smallpox and scarlet fever; and has sometimes supervened in the course of hooping-cough, particularly in plethoric and cachectic persons, and in those affected with visceral disease. It is not unfrequently symptomatic of scurvy or purpura hæmorrhagica; the blood being exuded from the extreme vessels in consequence of deficient tone and weakened vital cohesion of the villous coat of the stomach, and of the whole digestive canal. In these latter complications, the quantity of blood evacuated by stool is often greater than that thrown off the stomach. Lastly, hæmatemesis sometimes occurs in persons affected by intestinal worms, especially tænia and lumbrici. It is, moreover, occasionally complicated with hysteria and disorder of the uterine functions. It not infrequently alternates with, or is supplemental of, some other hæmorrhage.

155. In the first and second of the foregoing states, constituting the more *idiopathic* varieties

of hæmatemesis, as well as in the third and fourth, forming the *symptomatic* and *complicated*, conditions, the appearance of the stools is the next deserving of attention to the quantity and state of the blood thrown off the stomach. In many cases, the quantity of blood passed from the bowels is greater than that vomited. This happens most frequently when the blood is slowly effused, without irritating the stomach. It then passes the pylorus, and undergoes a partial digestion, or mixes with the secretions poured into the alimentary canal; imparting a very dark colour, or pitchy or black grumous appearance, to the stools.

156. *E. Vomiting of Black Matter*—the *morbus niger* of the ancients.—When the blood continues long congested in the capillaries of the stomach previous to its effusion, it gradually acquires a dark colour, and loses the property of coagulating. When, also, the congestion of the venous capillaries has continued long, the arterial ramifications passing into them necessarily participate in this state, the blood in them assuming venous characters. This condition of the circulation of the organ sometimes occurs, especially in persons of a spare habit of body, of a morose, irascible, and melancholic temper; and of a pale, sallow, or jaundiced countenance; and is attended with, or followed by, pain and distension in the epigastrium and left hypochondrium, flatulence of the stomach, debility or sinking, horborygmi or tormina, and several other symptoms usually indicating the approach of hæmatemesis. At length, during great prostration of strength, or deliquium, followed by nausea, and sometimes colicky pains of the abdomen, vomiting of a black tar-like matter takes place, often with similar discharges from the bowels. This matter is occasionally extremely offensive, and is evidently the result of serious changes in the vital action of the vessels of the stomach, liver, and spleen; the tone of the capillaries, and the healthy cohesion of the digestive mucous surface, being lost, and thereby allowing the exudation of the altered blood into the cavity of the organ, this fluid becoming still further changed by admixture with the acid gastric juice and exhalations poured out by the villous surface. It will be seen from this, that I consider the discharge of a black matter from the stomach as a modification or variety of hæmatemesis, occurring in an extremely asthenic state of the frame, and most probably from some degree of perverted function, not only of the stomach, but also of the liver and spleen. It may be also inferred that a morbid state of the secretions from the mucous follicles and liver may co-exist with these changes, and that the admixture of those secretions with the effused blood may deepen the already dark colour of this fluid; but this effect is chiefly produced by the free acid shown by Dr. PROUT to exist in the gastric juices.

157. ii. *CAUSES.*—A. The *predisposing causes* of hæmorrhage from the stomach are,—hereditary conformation and disposition to hæmorrhagic affections; the female sex; the sanguine and irritable temperaments, and the melancholic and the hypochondriacal, especially in persons with a pale, sallow, or earthy appearance of countenance; the full and plethoric habit of body, and irascible disposition; indolent and luxurious modes

of life, particularly when adopted soon after puberty; addition to the use of spirituous liquors, or of inebriating fluids of any description; indulgence in too much food; the continued influence of moist and miasmatic states of the air; chronic affections and congestions of the abdominal viscera, particularly of the spleen, liver, and pancreas; the advanced months of pregnancy; and irregularity or suppression of the menstrual discharge. J. P. FRANK states that he has met with hæmatemesis most frequently between the thirtieth and and fiftieth years of age.

158. B. The exciting and determining causes are—blows and injuries on the abdomen, particularly on the hypochondria and epigastrium; violent concussions or succussions of the trunk; external or internal pressure on the stomach; the ingestion of irritating or hurtful matters into this viscus; the intemperate indulgence in food or stimulating liquors; the presence of worms, larvae, leeches, &c., in the stomach or upper part of the intestines; the irritation occasioned by morbid or excoriating bile on the surface of the duodenum or stomach; powerful or irritating emetics, especially when given in the advanced stages of fevers, or in cachectic or visceral diseases; the suppression of accustomed discharges, particularly the menstrual or hæmorrhoidal; the application of cold, or of cold and moisture, to the lower extremities or surface of the body, during perspiration or the catamenial period; unusual distension of the colon, owing to habitual or continued costiveness; neglect of the bowels, and consequent accumulation of fecal matters; violent fits of passion; disease of the vessels of the stomach, or collatitious viscera; the gravid uterus, and large tumours developed in any part of the abdomen. Whatever, in short, irritates the mucous surface of the stomach, or interrupts the return of blood from the organ, will occasionally produce the disease.

159. iii. SYMPTOMS.—A. Premonitory Symptoms.—The patient generally complains, previous to the accession of the hæmatemesis, of many of the symptoms of hæmorrhage, as well as of others peculiar to this species. These are commonly, cardialgia; tension or pain at the epigastrium, with either loss or increase of appetite; sometimes faintness, or a sense of sinking or of anxiety at this region; flatulent or acrid eructations; lassitude, with irregular chills and flushes of heat; an open, sharp, and soft pulse; a sense of pain, or heat and uneasiness, with distension and tenderness at the epigastrium and left hypochondrium. Sometimes the pains in these situations are severe and pulsative, or extend to the left shoulder and scapula; and there is generally more or less of nausea, expression of anxiety, and pallor of the countenance. In rarer instances the attack commences without any premonitory symptoms sufficient to attract attention; and cases even of death from hæmorrhage into the stomach have been observed by FRANK (*De Cur. Hom. Morb.* t. vi. p. 198.) and others to have occurred suddenly, without any external discharge, or symptom indicating the cause of sudden dissolution. In some instances I have ascertained that, for a long time previously, evident symptoms of chronic gastritis had been present, of which the hæmatemesis was a consequence.

160. B. The pathognomonic phenomena of the

disease soon succeed to the above: the nausea is followed by increased pain, uneasiness, and tenderness at the epigastrium, and with vomiting of blood, either fluid or coagulated, pure, or mixed with the contents of the stomach. The blood, and other matters thrown up, come away with more or less effort; frequently with comparative ease, even when the hæmorrhage is the greatest, and seldom with much previous retching: it is sometimes gulped or eructated upwards. When the quantity of blood thrown up is great, the effort at ejecting it may sometimes occasion irritation in the pharynx, and excite coughing; and, from this circumstance, cause some doubt as to the seat of effusion, but the history of the case, and an attentive examination of the phenomena (§ 159, 160.), will show the nature of the disease.

161. The appearance of the blood varies with the quantity effused, and the time it has been retained in the stomach, but especially with the state of the vital energies, and of vascular action, previous to, and at the time of, the hæmorrhage. Where the discharge is attended by increased action, and the quantity is large, or when it has been poured from a considerable vessel or vessels, the blood is generally pure and unmixed with the ingesta. Where it has been effused from an artery or ruptured aneurism, it is florid and fluid; but if it have slowly oozed from the congested mucous surface, or depended upon congestion or other disease of the spleen or liver, it is of a dark venous colour, sometimes grumous, at other times fluid, and either pure, or mixed with the secretions or other matters contained in the stomach. In some cases (the *morbus niger* of old authors) the blood is nearly black, of a tar-like hue, or grumous, particularly in the hæmatemesis occurring during the progress of old remittent and malignant fevers, where there has evidently existed for some time impaired tone of the mucous surface of the stomach and of its capillaries, and of the vessels of the spleen, with congestion of these viscera, and obstruction of the liver.

162. In some instances, particularly when the disease has been preceded by inflammatory symptoms referable to the stomach, membraniform, polypous, or fleshy substances, are found amongst the coagula ejected from this viscus. These substances evidently proceed from inflammatory action in a part of the villous surface, with effusion of coagulable lymph, this action being followed by, or accompanied with, or even consequent upon, a more or less active hæmorrhage.

163. After hæmatemesis, the patient often experiences much relief from the more severe symptoms ushering it in; and this continues until shortly before a return of the attack, which may be repeated oftener than once, with intervals of relief of irregular duration. When the effusion of blood into the stomach is continued for a prolonged period, the vomiting of this fluid is repeated at short intervals. And occasionally the hæmorrhage occurs, particularly in those addicted to ingurgitation and the immoderate use of spirituous liquors, in short and slight fits, at short and regular intervals. I have remarked it, particularly in persons of a full habit of body who have been addicted to those indulgences, recur every morning, even for several weeks or months, with temporary relief to all the symptoms, and disappear

only occasionally for longer periods than 24 hours. Sometimes a single attack of considerable severity is followed by many months of comparative health; and when it is critical of engorgement of the spleen or liver, it may not again return, under proper treatment. When hæmatemesis is succedaneous or vicarious of some other accustomed sanguineous evacuation, it often recurs at regular intervals, as in the second variety of the affection. After an attack, the bowels are generally relaxed, and the dejections dark-coloured, from the presence of blood in them, and extremely foetid. Sometimes the stools are quite black, and of the consistence and appearance of tar. This state of the evacuations (*the melæna* of old authors) often continues for some time after the vomiting has ceased; and they are often preceded by colicky pains through the abdomen, distension, flatulence, tormino, and even slight meteorismus.

164. There is seldom much fever or heat of surface; but the pulse is quickened, sometimes full and developed, or even strong, in the more active or sthenic states of the disease, particularly at the commencement of the attack. But in the asthenic states of the system, or as the disease advances, and the attacks are repeated, it is commonly small, soft, and accelerated, and occasionally very compressible and open. The tongue presents various appearances, which depend more upon the concomitant and primary lesions producing the effusion of blood, than upon this occurrence alone. It is sometimes furred, but more commonly loaded at its base, or coated with mucus merely, or it is red, particularly its point and edges, and lobulated, or fissured: sometimes it is apparently raw and livid, particularly in the worst cases.

165. *C. Appearances on Dissection.*—There are few lesions to which the stomach and other abdominal viscera are liable, that have not been found in fatal cases of hæmatemesis. The chief of these, particularly in the primary forms of the disease, are—dark red, purplish, brown, or black patches, streaks, or spots, of the internal surface of the stomach; an enlarged, dilated, or injected state of the capillaries in this surface, permitting, according to the observations of PORTAL, injections thrown into the gastric arteries to pass into the cavity of the viscus; very rarely rupture of any of the vessels, excepting in connection with ulceration, or atheromatous deposits in their coats; generally a relaxed state of the vessels, with diminished cohesion, or a softened, dark-coloured, blackened, tumid, infiltrated, ecchymosed, and flabby condition of the villous and sub-villous tissues; occasionally a flaccid, dilated, and pale state of the whole organ, the vessels having been emptied by the hæmorrhage; sometimes similar alterations to the above of the internal surface of the duodenum, or of the œsophagus, either independent of (GAUBE, in *Rev. Med.* t. i. p. 394. 1825), or associated with, the foregoing lesions of the stomach; collections, varying much as to quantity, of coagulated, semi-coagulated, or grumous, dark-coloured blood in this viscus, and in the duodenum, and of a still darker, pitchy, and foetid blood, mixed with morbid secretions and fecal matters, in the intestinal tube; and a nearly empty state of the veins. In some cases, especially of the symptomatic forms, the mucous surface of parts of the small or large intestines

presents similar appearances to those seen in the stomach. In a few instances, there is but little change from the healthy state of this viscus, the principal morbid changes existing in the liver or spleen, or in the pylorus or œsophagus; and, in a few others, the mucous membrane is red, injected, and covered in parts by a layer of coagulated lymph or of jelly-like fluid. In addition to one or several of the above lesions, there have been observed, in rare cases, erosion of one or more arterial vessels (RICARD, LATHAM, CLARK, and myself) of the stomach; a dilated or varicose state of the veins (RULLIER), and even rupture of the varicose veins (STOLL, ROZIERE); great dilatation of the vasa brevia, the meseraic, mesocolic, and splenic veins, and ulcerations and perforations of the œsophagus and duodenum, as well as of the stomach.

166. In the more decidedly symptomatic and complicated states the various alterations to which the abdominal viscera are liable are severally observed, but those which are more directly connected with hæmorrhage into the stomach are—congestion, enlargement, and softening of the spleen, its vessels containing a black, semicoagulated, or grumous blood; unusual hardness and diminished size of this viscus, portions of it being converted into cartilage, and deposits of bone on its surface; congestion, tubercular formations, interstitial deposits, tumours, scirrhus, atrophy, and other changes in the liver, causing obstruction of the portal circulation; tumours pressing upon the vena porta, and lesions of its coats, or of parts connected with it, diminishing its calibre; enlargement or scirrhus tumours of the pancreas (VAN DOEVEREN, myself, and others); alterations of the coats of the large vessels, and aneurisms, particularly of the aorta, opening either directly or mediately into the stomach, or œsophagus; adhesions of the spleen to the stomach, with perforating ulcers of the latter, penetrating into the former; fungous or other tumours of the stomach or pylorus (WHYTT, NIEMANN, PORTAL, &c.); scirrhus of the cardiac or pyloric orifices, tumours developed at the root of the mesentery, and organic changes of the kidneys. The most common of these are, the alterations of the spleen and liver, especially enlargement of the former, and lesions of the whole structure of the latter; changes affecting merely a part of the organ, or not materially obstructing the portal circulation, having but little influence in the production of hæmatemesis.

167. *D. Pathological Inferences.*—From the phenomena observed in connection with this disease, both during life and after death, it may be inferred—1st. That the effusion of blood into the stomach is sometimes a termination or consequence of active congestion, or of inflammatory irritation, of the villous surface of this viscus, and sometimes also of the parts of the digestive tube adjoining it—*inflammatory hæmatemesis*;—2d. That the hæmorrhagic discharge frequently arises from interrupted circulation in the spleen or vena porta, or both, and consequent congestion of the veins and venous capillaries of the stomach, causing increased action of the arteries, with dilatation of, and consequent effusion from, the exhalant pores of the congested surface—*congestive symptomatic hæmatemesis*;—3d. That the effusion occasionally proceeds from diminished or lost vital cohe-

sion of the villous surface, and impaired tone of the capillaries of the stomach, with general adynamia—*asthenic symptomatic hæmatemesis*;—4th. That, in rare instances, the hæmorrhage arises from an aneurism, from ulceration or perforation of an artery or vein; and more frequently from malignant, fungoid, or ulcerated tumours in the stomach, or near either of its orifices, &c.—*complicated hæmatemesis*.

168. iv. DIAGNOSIS.—The vomiting of blood is no proof that this fluid is effused primarily from the stomach, or even from the œsophagus or duodenum; for, as I have shown above (§ 91. 99.) very dangerous hæmorrhages often proceed from the posterior nares, fauces, or pharynx, and even from the respiratory organs, yet but little blood escapes externally from these situations, the greatest quantity passing into the stomach, whence, if it be considerable, it is afterwards thrown off by vomiting. Where the hæmorrhage takes place slowly, hæmatemesis does not occur, the blood having nevertheless flowed into the stomach, and thence into the intestinal canal, admixing with the secretions and alimentary matters, and colouring the dejections. Hence the presence of this fluid, even in the stools, is no proof that it has been effused either in the stomach or duodenum, as it may have been, as now stated, poured out from the œsophagus, or from the throat, &c., and have passed downwards instead of upwards. In cases, however, of hæmorrhage from the superior portions of the digestive tube, the blood is more or less changed or intimately mixed with the intestinal secretions and fecal matters; and the stools present, in their black colour, or their grumous, sanious, or tar-like appearance, indications of considerable remora, or of partial digestion of the effused blood in the alimentary canal.—These appearances may be thus modified, not only by this circumstance, but by the action of the acid in the gastric juice, or by acidity in the bowels, and by admixture with the biliary and pancreatic fluids. They will necessarily also vary with the quantity of blood effused, with the particular seat of effusion, with the state of the system, and with various concomitant circumstances, in respect of the causes and states of the digestive viscera.

169. The diagnosis, therefore, of true hæmatemesis from the vomiting of blood consequent upon the passage of this fluid into the stomach from the pharynx and adjoining parts, requires more attention than has been directed to it; and it is chiefly from a careful inquiry into the history and phenomena of the case, and from the premonitory symptoms referable to the stomach, spleen, or liver, that a correct opinion can be formed.—Where these symptoms have ushered in hæmatemesis, there need hardly be a doubt as to the stomach being the seat of effusion, and in this case the blood is very often dark-coloured, grumous, or coagulated, mixed with portions of ingesta, or with a pale or colourless ropy fluid, or with bile. In some cases, the passage of the blood over the glottis occasions more or less cough, and causes some doubt as to the source of hæmorrhage. In these, however, as well as in others, the absence of the symptoms ushering in, and characterising, hæmoptysis (§ 98. 99.), will distinguish hæmatemesis from that form of hæmorrhage. The dyspnoea, the bubbling sensa-

tion in the trachea and about the top of the sternum, the florid and frothy appearance of the blood, or the presence of bubbles of air in it, are all present in the former; but are absent in the latter. Dr. WATSON very justly remarks, that the symptoms usually succeeding the hæmorrhage, in either variety, afford much assistance in forming a judgment in some doubtful cases. Generally copious hæmoptysis proceeds for some time in a succession of mouthfuls, whereas there is mostly only one access of full vomiting; and, at the close of the former, the patient manifestly coughs up and expectorates smaller quantities of blood, whilst, a few hours after the latter, slight gripping pains are felt in the abdomen, and stools such as I have above described are passed.

170. Other circumstances, also, connected with the diagnosis of hæmatemesis, ought not to be overlooked, especially the visceral diseases of which it is frequently a consequence, and the affections upon which it may be contingent, or of which it may be supplemental or vicarious. When blood is vomited in the course of *cancer* or *scirrhus* of the stomach or of its orifices, besides the symptoms indicating these maladies, this fluid is generally changed to a dark or black, grumous, or even inky appearance. When hæmatemesis occurs in the course of *scurvy* or of *purpura*, the circumstances are generally such as to leave us doubt as to its source. If it take place after a fit of *hooping-cough*, it is often difficult to determine whether the blood be discharged from the stomach, or from the respiratory passages; but attention to the phenomena just pointed out (§ 168; 169.) will obviate any error. When hæmatemesis proceeds from a ruptured *aneurism*, or from an ulcerated or ruptured vessel, the quantity of blood thrown up is generally great, and unmixed with other matters, and sometimes more or less florid and fluid. The exhaustion, fainting, pallor, and sinking attending it, are extreme, and a fatal result occasionally soon supervenes; but more frequently the exhaustion and sinking or syncope arrests the hæmorrhage, and the patient apparently makes a short or slight progress in recovery; but after some mental or physical excitement, or after slight exertion, the hæmorrhage recurs, and death either takes place, or another respite is obtained. In many of these extreme cases, a great part of the effused blood is retained, and found in the stomach and intestines on dissection.

171. v. PROGNOSIS.—In proportion to the severity of the symptoms referable to the stomach, liver, and spleen, particularly the pain, tenderness, anxiety, and fullness in these situations, the danger may be considered great. When these are very distressing, the quantity of blood ejected considerable or excessive, dark-coloured, pitchy, fetid, or grumous; when the vomiting is attended with sinking, with a very quick, weak, small, or an open and compressible pulse, or with signs of cachexia, and of organic disease of any of the abdominal viscera; if it be preceded by symptoms of inflammation of the stomach and adjoining viscera; if it have proceeded from acrid poisons, or from severe injury; if it be attended or preceded by dropsy, jaundice, hypochondriasis, or a sallow, sunk, earthy, or waxy state of the countenance or general surface; if fainting, or syncope come on and be protracted, or recovery

from them imperfect; if the eyes be sunk, the features pallid and sharp; if there be great distension and tenderness at the epigastrium and left hypochondrium; and, lastly, if the patient have cold extremities and cold sweats, the danger is generally great, and, with the latter symptoms, extreme.—If the symptoms ushering in the attack, or preceding it for some time, be either imperfectly mitigated, and still more if they be increased by the discharge of blood, an unfavourable inference as to the issue may be formed. If hæmatemesis occur in the last stage of fevers or of the exanthemata, in the old and cachectic, in persons who have gone through a long course of intemperance, or who have laboured under chronic abdominal disease, particularly if the hæmorrhage be great, or impart no relief if moderate, danger may be inferred, although it may not be immediate in the latter circumstances.

172. When, on the other hand, the disease has been caused by a fit of anger, by the suppression of an accustomed evacuation—as the catamenia, hæmorrhoids, epistaxis; or if it be vicarious of these, or when it has occurred on the disappearance or suppression of an external discharge, eruption, &c. the patient being otherwise healthy, or not far advanced in life; if the hæmorrhage is not excessive, or very frequently repeated; if the premonitory and attendant symptoms be not severe; and if the attack be soon followed by relief, and a return of the appetite and digestive functions; if the abdomen and hypochondria be without tenderness, unnatural fullness, or tumour, upon an accurate examination, the prognosis may be favourable. Yet an attack of hæmatemesis should be always considered deserving the utmost attention and skill of the physician.

173. It has been generally stated, that periodic hæmatemesis vicarious of menstruation is unattended by danger; but there are many exceptions to this, arising from circumstances alluded to above (§ 171.). Mr. NORTON met with two cases of this form of the disease which terminated fatally. Upon the whole, therefore, the prognosis ought entirely to depend on the nature of the case, the age of the patient, the state of vital power and vascular action, and especially upon the complication, and the visceral lesions from which the attack proceeds. Dr. SCHMIDTMANN states, that in plethoric patients, and in cases not characterised by much visceral disease, hæmatemesis seldom proved fatal in his practice; and my experience confirms this result. In one case, where it recurred almost daily, & violent attack of gout and the subsequent regimen have prevented its recurrence for years. HOFFMANN found five cases fatal out of eight, in those depending upon visceral disease, and broken down powers of the frame. When hæmatemesis assumes or even approaches to the characters constituting the *morbus niger* of the older writers, or indicating structural or malignant disease of the stomach or its orifices, the prognosis must be extremely unfavourable.

174. vi. TREATMENT.—The indications are—1st, to prevent, or to arrest the attack; 2d, subsequently to remove the pathological conditions, on which the hæmorrhage depends.—A. The physician has seldom an opportunity of prescribing for the premonitory symptoms of hæmatemesis; but cases sometimes present themselves,

in which it is necessary to have recourse to means, when these symptoms recur, in order to prevent the seizure.—In these circumstances, a moderate venesection or cupping over the hypochondria, warm mustard pediluvia, a full dose of calomel, followed by cooling purgatives, cathartic enemata, cooling diaphoretics conjoined with demulcents, and spare farinaceous diet, will generally be efficacious, especially if excited or sthenic action be present. If the powers of life be depressed, instead of the bloodletting, a sinapism, or the warm turpentine epithem, may be applied over the region of the stomach. If the attack is apparently supplemental of hæmorrhoids, or of the catamenia, leeches may be applied around the anus, or near the groins, and aloeic purgatives should follow a full dose of calomel. A blister, or stimulating plaster, may also be applied to the sacrum. In cases of obstructed catamenia, cathartic enemata, with a full dose of spirits of turpentine, may be administered.

175. B. During the attack, the treatment must be directed conformably with the principles inculcated above. The question as to the propriety of arresting the hæmorrhage should hardly be entertained in this disease more than in hæmoptysis (§ 136.); for, although the hæmorrhage may sometimes proceed with less risk in the former than in the latter, or even occasionally with advantage; yet, as the quantity of blood thrown up from the stomach is no sure indication of the amount effused, and as the ends likely to be fulfilled by the internal discharge may be more safely attained by treatment, even when circumstances seem most favourable to the allowing of the hæmorrhage to proceed, it will be safer, as a general rule, to employ appropriate means to arrest the attack, and at the same time to accomplish all that the unrestrained effusion could have produced. Even in cases of supplemental or vicarious hæmatemesis, when it is supposed by some advantageous to allow a free discharge, danger may result; for the hæmorrhage may be fatal, although little blood is vomited, the stomach and intestines being filled with the effused fluid.

176. a. For hæmatemesis the means of cure are to be selected according to existing pathological conditions. In plethoric and robust persons; in cases depending upon congestion of the liver or spleen, or upon suppressed discharges; and where indications of increased or sthenic action are present—in those circumstances that might indicate the propriety of allowing a copious effusion to take place, it would certainly be improper to arrest the disease at its commencement by the internal use of powerful astringents; but it would be judicious to do so, by removing the pathological states of which the hæmorrhage is the effect, by venesection—copious or repeated, according to circumstances; by cupping over the hypochondria; by purgatives and cathartic enemata, and by external derivations. In these, the more active states of hæmatemesis, refrigerants, cooling diaphoretics, and the other means advised in similar states of hæmorrhage (§ 35. et seq.), may be also employed. Whenever the disease continues, notwithstanding free vascular depletion, and external derivation, there can be no doubt of the propriety of having recourse to the more powerful astringents. In the more active forms, however, a full dose of calomel, followed in a few hours by a

purgative draught, and this by a cathartic enema, so as to procure copious alvine evacuations, should precede astringents. When the hæmorrhagic discharge is so copious as to forbid the delay which this practice would occasion, the calomel should be followed, in a very short time, by a full dose of oil of *turpentine*, given on the surface of milk, or of some aromatic water, or of this medicine conjoined with castor oil. If this draught be thrown off the stomach, it should be repeated; and it may be even again preceded by the calomel. Notwithstanding its usual nauseating effect, *turpentine* is generally retained in hæmatemesis; and it allays the vomiting, by arresting the hæmorrhage. It may be given in any dose, from twenty to thirty drops, every half hour, to half an ounce or more at considerable intervals; it may also be administered in *enemata*, or applied externally in the form of *liniment* (F. 311.) or *epithem*. I have resorted to this practice upwards of twenty years, and am convinced that it is safer and more generally appropriate than any other yet recommended.

177. *b. Cold*, in various modes of application—as in *enemata*, applied over the epigastrium, iced fluids, lemon and other water ices, taken into the stomach—has been directed in active hæmatemesis, and is often efficacious. But this treatment, as often merely suspends the hæmorrhage, which returns as soon as it is relinquished—sometimes with greater violence. It occasionally also merely checks the vomiting, while the sanguineous effusion still continues. It requires caution and discrimination, and ought not to be confided in alone, when the discharge is very profuse, or the case urgent. Where enlargement, or passive congestion, of the liver or spleen exists, the propriety of this practice is very doubtful. In passive hæmatemesis it is injurious.—*Nitre* (F. 95. 294. 644.) or *muriate of ammonia* (F. 864.) may also be tried in the active states of the disease, as being appropriate to them.

178. *c. Of the astringents*, the acetate of lead in large doses, with opium, or with pyroligneous acid, acetate of morphine, and *kréosote*, is the most efficacious. In the latter combination I have lately seen it successful. The combination mentioned above (§ 131.), as constituting *Ruspini's styptic*, or the *styptic solutions* prescribed in the appendix (F. 9—12.), or the *astringent balsams* (F. 8—22.), the subnitrate of bismuth or sulphate of zinc, with narcotics, and most of the substances already noticed under this head (§ 40, 41.), will often be of service. In the passive, or profuse states of the disease, the more tonic astringents—as the tincture of the muriate of iron, the oil of *turpentine* with aromatics, the sulphates and sulphuric acid with opium (VOCZL, RULAND, VICAR), and infusion of roses; also in milk-whey (STRÖM, WILICH, LINDT, &c.), are useful.

179. *d. Emetics*, especially the sulphate of copper, or of zinc, are efficacious in some cases. They have been employed by RICHTER and KECK.—Dr. SHERIDAN states, that both he and his father have resorted to *ipecacuanha* emetics in hæmatemesis with general success. Very recently the *secale cornutum* has been recommended; and I have lately employed the *kréosote* in two cases with benefit, and have conjoined it with pyroligneous acid, acetate of lead, and acetate of mor-

phia.—Camphor is mentioned by MARCARD, but it is useful chiefly as an adjunct to other means. The acid formed by the fermentation of buttermilk or whey is noticed by VAN DER HAAR. I have seen it employed in some northern parts of Europe with benefit. Blistering the epigastrium is directed by VOOEL and TOGENBURGER, and should not be neglected, if the other modes of counter-irritation already noticed (§ 36. 47.) be not adopted. Of the various anodynes, opium has been justly preferred by YOUNG, JONES, ROESCHLAUB, DORFFMÜLLER, and MARCUS; the salts of morphine are now frequently employed, the one most congruous with the other substances prescribed being selected.

180. *C. The Treatment after the attack* is often of greater importance than that of the attack itself. It is chiefly then that the pathological states producing it can be removed. The means of cure should have strict reference to these states (§ 146.), and especially to those of the liver and spleen. There are few cases in which a judicious, regular, and persevering use of mild *purgatives* will not prove serviceable. When there is enlargement or engorgement of the liver, deobstruent and chologogue aperients, occasional cupping below the right shoulder-blade, and a mild farinaceous diet, are required; calomel, blue pill, PLUMMER'S pill, taraxacum, the super-tartrate of potash, and the neutral salts, being the most appropriate aperients. When the spleen is enlarged, *purgatives* are also necessary; but they should either be conjoined or alternated with tonics; and calomel be either laid aside, or be given with caution. In either state, *purgative draughts* (Form 99.), deobstruent liniments (F. 296. 311.) applied over the hypochondria, the nitro-muriatic solution taken internally and used externally, blisters and other external derivatives, will be useful. Cathartic *enemata* are also serviceable, especially when the bowels are very sluggish, or when the catamenia are interrupted. Most continental writers reprobate the more active *purgatives*, and venture only upon mild aperients, as rhubarb, manna, tamarinds, &c. When the disease depends chiefly upon relaxation, or irritation of the digestive mucous surface, this caution is very proper; but when the collatitious viscera are chiefly in fault, or when the catamenia are suppressed, the opinion of Dr. BATEMAN, given strongly in favour of the practice recommended by Dr. HAMILTON, is perfectly just.

181. In hæmatemesis vicarious of menstruation, or of hæmorrhoids, *purgatives* are required; but they should be suited to the peculiarities of the case. When the amenorrhœa is connected with plethora, local depletions, from the groins or tops of the thighs, should be prescribed, and repeated just before the return of the menstrual period, or of the internal hæmorrhage; but when it is connected with adynamia, and a chlorotic or anæmic state of system, the preparations of iron, with myrrh, aloes, or other substances, which circumstances will suggest, should be employed.—In the aged, debilitated, cachectic, and in those addicted to fermented or spirituous liquors, *purgatives* should be given with caution, those of the mildest kind, in connection with tonics and restoratives, being selected.

182. When the stools continue black some time after hæmatemesis has ceased, this colour

not having arisen from the use of chalybeates, the exudation of blood from the upper parts of the digestive tube—either from the stomach, in so small a quantity as not to excite vomiting, or from the duodenum, or parts in the vicinity—may be inferred. In this case, purgatives, unless those of an astringent or tonic kind, as *Form. 99*, tamarinds, rhubarb, &c. would be injurious. In some prolonged cases of this kind in which I have been consulted, the spirit of turpentine, either in small and repeated doses, or in a full dose, has been most successful; but the external applications just noticed, and means appropriate to the complications which these cases usually present, should not be neglected.

183. *D.* The regimen in hæmatemesis does not differ materially from that already recommended. During the continuance of the discharge, total abstinence should be enjoined; but afterwards, mild, mucilaginous liquids, and farinaceous food in small quantity, may be allowed; and the transition to solid and more nutritious diet carefully and gradually conducted. The drink should be cooling and astringent; and appropriate to the states of the digestive organs, especially the liver and spleen. Those prescribed in the appendix (*F. 591*—*596*, *915*, *916*.) will be found very generally appropriate. Subsequently, change of air, regular exercise on horseback, and the use of the deobstruent mineral waters, as those of the Beulah Spa, or of Cheltenham, and the factitious Ems or Carlsbad waters at Brighton, ought to be recommended.

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VII. HÆMORRHAGE FROM THE INTESTINES AND MELÆNA.—*SYN.* Intestinal Hæmorrhage, Melæna, Melæna, Melæna Nocturna, ἡδὲ, αἱματίνης, Hippocrates; Morbus Niger, Auct. Lat. var.; Fluxus Splenicus, Gordon; Dysenteria Splenica, Ballonius; Nigra Dejectiones, Scheyck; Scæcessus Niger, Hoffmann; Melæna, Sauvages, Sagar, Good; Melanorrhagia, Swediaur; Schwartz Krankheit, Schwartz Blutfluss, Germ.; Maladie Noire, Fr.; Melena, Ital.

DEFIN.—The evacuations from the bowels, containing fluid, grumous, or coagulated blood, or presenting a black or pitchy appearance, with or without vomiting of blood.

184. I have considered melæna in connection with intestinal hæmorrhage, although the blood, colouring the evacuations, proceeds, perhaps, as frequently from parts above, as from those below, the pylorus: it may even come from the mouth, nares, or fauces, or from the respiratory passages, as I have already shown. The melæna of HIPPOCRATES was the morbus niger noticed above, or a variety of hæmatemesis (§ 156.); the application of the term melæna chiefly to black-coloured dejections being of modern date, and I believe justly ascribed to SAUVAGES. I have viewed it according to this acceptance, and connected it with intestinal hæmorrhage, as it always arises either from this source, or from blood which has passed into the intestines from parts above the pylorus. At the same time, the frequent association of melandrid stools with vomiting of blood, in any of the states above described, has been kept in recollection, and considered as a result of the patholo-

gical conditions, causing the sanguineous effusion either in the stomach, or in the small intestines, or even in parts above the former viscus.—Indeed, melæna may occur not only in any of the circumstances in which hæmatemesis has been shown to supervene, but also in some of those connected with the other hæmorrhages already noticed.—This fact is fully demonstrated by observation, and by the writings specified above, as well as those referred to at the end of this article. Melæna may also appear in the course of cachectic maladies, especially scurvy, purpura, jaundice, &c.; or of adynamic or malignant fevers; or of malignant adventitious productions.—In order to arrange the various conditions in which blood is voided from the bowels, unconnected with hæmorrhoids, I shall notice—1st. *Intestinal hæmorrhage*, the stools not exhibiting the melanoid appearance—2d. *Melæna*, in relation to the sources of hæmorrhage, and to its complications.

185. i. *Intestinal Hæmorrhage, the Stools containing fluid or coagulated Blood, or Simple Intestinal Hæmorrhage*—*Hæmor. Intestinorum*—*H. Intestinalis*—occurs, 1st, from interrupted or impeded circulation through the liver; 2d, from congestion and loss of the vital tone of the capillaries of the mucous coat of the intestines; 3d, from ulceration of the intestinal tunics; and, 4th, from inflammatory irritation, or its consequences in these tissues.—*A. Intestinal hæmorrhage*, perhaps, most frequently arises from *impeded circulation through the vena porta*. Even when other pathological states seem to produce it, this may be a concurrent cause; hence, all those lesions of the liver that occasion some impediment to the portal circulation, may be connected with it. It has also been seen complicated with enlargement and induration of the pancreas, with engorgement of the spleen, with tumours about the root of the mesentery, and with enlargement of the mesenteric glands. These latter lesions are, however, rather contingently associated with the hæmorrhage, than concerned in the production of it; whereas, those alterations—as induration, atrophy, scirrhus, enlargement, and tubercular or other changes of the liver, which impede or obstruct the circulation of the vena porta, are the efficient of the sanguineous effusion: hence the occurrence of intestinal hæmorrhage, not only in the course of these lesions, but occasionally also in connection with ascites or anasarca; or even with hæmatemesis, or after protracted intermittent or remittent fevers. In these cases, the blood is exuded from the intestinal mucous surface, as first inferred by GLISSON; and it is either fluid, grumous, or coagulated, and of a venous or very dark hue, as it is changed by the intestinal gases and secretions, or by its remora in the bowels. The appearance of the blood also varies according to the situation in which it is exuded.

186. *B. Impaired vital tone of the intestinal mucous surface and of the capillaries supplying it*, with congestion or engorgement of those vessels, is also a frequent cause of intestinal hæmorrhage. It is owing to this pathological condition, that blood is discharged from the bowels in purpura in the early course of fevers; in scurvy, and in other cachectic maladies. In fevers, however, there is probably more or less active determination to this part of the economy, especially in those cases in which the hæmorrhage occurs early,

or in which it proves critical. When it takes place in the course of petechial, putrid, or malignant fevers, it is generally passive, or entirely dependant upon the pathological conditions under consideration. In these cases, the blood discharged is generally fluid and grumous, and is of a venous or dark hue. When it is evacuated in an early stage of continued fever, or is critical, it is sometimes partially coagulated, or coagulates loosely after it is passed.

187. *C. Ulceration of the intestines frequently occasions hæmorrhage*.—The discharges of blood from the bowels in the advanced or latter stages of dysentery, or chronic diarrhoea, and of continued fever, are often owing to this cause, although they may also proceed, in these stages of fever from the pathological states just mentioned (§ 186.). Intestinal ulceration unattended by fever may also give rise, although rarely, to hæmorrhage. Instances have even occurred in which ulceration had gone on to perforation of the intestine, and adhesion of it to an adjoining viscus, the consequent hæmorrhage proceeding from the ulceration in that viscus. M. RAYET met with a case in which the duodenum and transverse colon were perforated and adherent to the liver, the ulceration in this latter organ having divided two branches of the *vena porta*, and occasioned fatal hæmorrhage.

188. *D. Inflammation of the bowels is rarely attended by hæmorrhage to a great amount, unless it terminate in ulceration*. It sometimes, however, gives rise to discharges of blood, especially when the cæcum or colon is affected; or when portions of the intestines are intussuscepted.—It has been supposed by some writers, that *blood may be discharged from the liver along the ducts*; but of this we have no satisfactory proof; and it is certainly by no means probable that this fluid will be passed from the secreting structure of this organ.

189. *The appearance of the blood effused from ulcerated vessels, depends upon their seat and size, and upon the nature and stage of the antecedent disease*. In far advanced cases of fever or dysentery, the blood is generally fluid, or grumous, and dark. When a large venous branch has been ulcerated, and the hæmorrhage has been very copious, large soft coagula, with much sanguineous serum, are generally passed by stool. In the inflammatory states of intestinal hæmorrhage, as in the early stages of acute dysentery, the blood is fluid, mixed with lymph and mucus, and not in very large quantity, unless ulceration has occurred. The blood discharged furnishes no sure indication as to the seat of the effusion. When, however, it is fluid and unmixed with fæcal matters, the lower bowels are probably the seat. The ancients supposed that if the blood passed before the fæcal matters, it proceeded from the lower parts of the bowels; and that, if it was voided after the fæces, it was effused by the upper parts: but this is no sure criterion. When the hæmorrhage is profuse, the blood acts as a cathartic, occasions severe colicky pains, and is often the only substance evacuated.—When it is very dark and grumous, or consists of small coagula, and of a sanious fluid, it has generally either been long retained, or been poured out in the upper portions of the canal. The appearance, however, very much depends upon the states of

the vascular system, and of the blood itself at the time when the hæmorrhage occurred; for, if it take place in the latter stages of adynamic or malignant fevers, the blood evacuated will be fluid or grumous as well as of a dark hue, or otherwise altered.

190. ii. *Melæna in relation to its sources and complications.*—When blood either flows into the stomach from any of the situations noticed above, or exudes from the internal surface of this viscus in so gradual a manner, or so slight a degree, as not to excite vomiting, but passes the pylorus, and when it is exhaled from the internal surface of the duodenum or small intestines, the evacuations often assume a perfectly black colour, and tar-like consistence. In hæmatemesis, the stools frequently have this appearance (§ 163.), owing to the passage of a portion of the extravasated blood into the bowels. This colour is manifestly owing to the admixture of the blood with the biliary and intestinal secretions, and to the action of the acid and gaseous matters contained in the digestive canal; although other explanations have been advanced (§ 192, 193.). Indeed, the evacuations often present, in nearly the same states of constitutional or visceral disease, every variety of colour and appearance, from these just described as constituting melæna, to those resulting from the manifest and abundant presence of pure or venous blood. Evacuations, more or less obviously sanguineous, must be referred either to some one of the sources just noticed, or to the passage of blood from the stomach into the intestines. When the blood comes from parts above the pylorus, the stools generally have more or less of the melanoid character, and there frequently is, or has been, hæmatemesis; but when it proceeds from the parts below, the stools vary with the quantity of blood effused, and other circumstances, and are generally as described above.

191. HOFFMANN first, and MORGAGNI afterwards, attributed melæna to the discharge of blood from the over-distended and ruptured venous capillaries of the intestines, caused by obstruction of the portal circulation and of the spleen. Dr. CULLEN considered this to be the usual origin of the disease; but admitted that a true *atrabilis* might be formed, and occasion all the phenomena attending sanguineous melæna. Dr. GOOD comprised, as a species of this malady, that morbid state which has been called green or black jaundice, and which is very different from melæna, and not necessarily connected with it, although the stools often have a dark green or blackish hue, owing to alteration of the bile, probably from torpor of the liver and prolonged retention of this secretion in the biliary passages. (See art. JAUNDICE.)

192. Whilst HOFFMANN and CULLEN attributed the colour of the dejections to the remora and alteration of the blood previous to effusion from the venous capillaries, PORTAL, BICHAT, and others supposed that, in consequence of the impeded or obstructed circulation through the mesenteric and portal veins, the blood was more strongly determined to the extreme arterial capillaries or exhalants of the intestines causing distension of, and effusion from, these capillaries; and that the change in the blood from an arterial to a black hue was produced subsequently to the extravasation by the acids and gases in the digestive canal. — In opposition to these opinions, Dr.

AYRÆ has contended that both melæna and the black variety of hæmatemesis (§ 156.) arise from the passage of blood from the minute ramifications of the *vena porta* in the secreting structure of the liver, consequent upon extreme congestion of these vessels; a very dark blood, instead of bile, passing by the biliary pores into the hepatic ducts, and thence into the duodenum. This hypothesis is, however, not supported by pathological research, and is almost as difficult to refute as to establish. If all cases of melæna were preceded by manifest congestion, and its consequence more or less fulness or enlargement of the liver, the probability of this being the source of melæna would be much stronger than it is; but indications of congestion or of enlargement of this viscus are not uniformly observed.

193. Cases sometimes occur in which a very dark, black, or greenish-black bile is passed, the stools being fluid, or of the consistence of treacle, owing to the circumstance just alluded to, and more fully explained in the article on the GALL-BLADDER, &c. I have met with such instances connected with chronic disorder of the respiratory and digestive functions.—Cases also are rarely seen in which melanotic matter is voided by stool, owing to the breaking down of tumours or adventitious encysted formations, containing this matter, as admitted by Dr. MARCAND and Dr. GOLDIE, or to the exudation of this matter from the follicles, where it may have been secreted, if, indeed, such an occurrence ever takes place.—In order to distinguish between melæna arising from the *effusion of blood*, or from *black bile*, or from *melanosis*, the stools should be diluted with water, or with a weak solution of soda, when blood will become apparent if the black colour of the evacuations have depended upon this cause.

194. SAUVAGES and PORTAL have distinguished as many varieties of melæna as there are circumstances in which it presents itself. The latter of these pathologists has illustrated an interesting memoir on the subject, by numerous cases; but the varieties adduced by him are deserving of notice, chiefly as indicating the pathological states on which this morbid condition is contingent, and not any modification of this condition itself; for, as he admits, the matters voided are nearly the same in all. The excretion of black or melanoid stools are, according to M. PORTAL, met with as follows:—*a.* In the advanced course of continued fever;—*b.* In connection with periodic fevers;—*c.* After strong mental emotions;—*d.* After the suppression or cessation of hæmorrhoids, of the menses, or of any accustomed discharge;—*e.* From irregular, suppressed, or misplaced gout;—*f.* In the course of scurvy, whether depending upon engorgement of the liver and spleen, or upon alteration of the blood,—*g.* In dropsy, owing to the associated visceral disease, or to the abdominal effusion, or to both. This enumeration is, however, defective, inasmuch as the frequent dependence of melæna,—*h.* Upon disease of the liver, spleen, or pancreas, unconnected with scurvy or with dropsy,—*i.* upon carcinomatous, encephaloid, or fungoid productions in some part of the digestive canal,—and, *k.* upon tumours developed in the mesentery, has been overlooked in it.

195. iii. *CAUSES.*—The remote causes of hæmorrhage

rhage from the intestines and of melæna, are not materially different from those that occasion hæmatemesis (§ 157, 158.). Sedentary occupations; intense or prolonged anxiety, and close application to study or business; full diet and neglect of exercise in the open air; frequent contrarieties; an irritable temper, especially in the melancholic, or sanguineo-melancholic temperament; the intemperate and daily use of spirits or other intoxicating liquors; general debility and cachexia; and the period of life between forty and sixty; are the most common *predisposing* occasions of the disease. Violent mental emotions, particularly fits of anger; great excess in eating or drinking; irritating or drastic purgatives, and acrid poisons; the suppression of sanguineous evacuations or accustomed discharges; the visceral and constitutional maladies just mentioned; and the causes generally productive of hæmorrhage; are the common *exciting* causes of intestinal hæmorrhage.

196. iv. The SYMPTOMS connected with melæna and discharges of blood from the bowels have been partially adverted to (§ 189.). There have commonly been disorder of the digestive canal, as loss of appetite, nausea, or occasional vomiting, and indications of visceral disease, for a considerable time before the attack. A sallow, dusky, waxy, or leaden hue of the countenance; a foul, loaded, dark, or otherwise morbid state of tongue, and tainted breath; a soft or spongy state of gums; fulness, tension, or griping pains of the abdomen, or fulness or enlargement in the hypochondria; oppression or anxiety referred to the præcordia or epigastrium; great debility, faintness, sense of sinking, or syncope; flatulence or nausea; and a tensile or dull pain in one or other of the upper abdominal regions; sometimes vomiting of blood; vertigo and coldness of the extremities; tormina, or colicky pains in the abdomen; and a weak, soft, or open sharp or bounding pulse, usually precede and usher in the discharges of blood by stool, or tar-like evacuations. In some instances, the motions are fetid or extremely offensive; and in all the exhaustion is great.—In a few cases, the quantity of blood passed from the bowels has been small; yet a fatal termination has occurred, preceded by tormina, and by fulness or tension of the abdomen. In these, the hæmorrhage has been concealed, the bowels being found upon dissection filled by semifluid or coagulated dark blood.

197. v. The DIAGNOSIS of intestinal hæmorrhage and melæna is often difficult; *first*, as respects the seat of effusion; and *secondly*, as regards the resemblance to other affections, particularly biliary disease and hæmorrhoids.—*a.* As to the source of hæmorrhage, the practitioner will be guided in forming his opinion by the circumstances already stated. He will take into consideration the probability of the blood having been poured out from parts above the diaphragm or pylorus, and the existing indications of such visceral disease as usually give rise to sanguineous effusion from the digestive canal.—*a.* If the colour of the stools be caused by black or morbid bile, dilution with water will impart to them a yellowish, greenish, or greenish-yellow hue. If it proceed from the matter of melanosis, dilution will give them neither a bilious nor a sanguineous tint. When the melanoid appearance depends upon

blood, the stools are generally offensive, and the sanguineous hue becomes very apparent upon dilution.—*b.* Intestinal hæmorrhage is often mistaken for internal hæmorrhoids; but it is readily distinguished from the latter, by the history of the case; by the tormina and spasmodic pains ushering in the attack; by the action of the bowels being unusual as to the time, and by the attendant sensations and symptoms; by the faintness and exhaustion attending it; by the existing evidence of visceral or constitutional disease; and by the imminent danger in which the patient is manifestly placed. Whereas hæmorrhoids are accompanied by the usual tumours, or by prolapsus of the inner coats of the rectum at stool, along with the tumours; and are generally followed by relief of most of the uneasy symptoms, the hæmorrhage occurring chiefly when the patient is passing his usual evacuation, which is commonly more or less fecal, or unmixed with the blood which is discharged.

198. The *appearances on dissection* are nearly the same as are seen in fatal cases of hæmatemesis (§ 165.). The liver and spleen usually present structural change, and occasionally also the mesenteric glands, the pylorus, and pancreas. Congestion, dark-red, brownish, or purplish patches, ulcerations, excoriations, &c. of the digestive mucous membrane, are often observed, especially when the hæmorrhage occurs in an advanced stage of fever (§ 51.), in scurvy, or in purpura. In these, the mesenteric and portal veins are very generally loaded with dark, fluid, or thick blood. In some instances, however, the digestive canal is not materially altered; and, in others, it is unusually pale and bloodless. The blood itself is often manifestly changed, the hæmorrhage, as well as the melanoid state of the stools, depending partly upon this circumstance, and partly upon the lost tone of the digestive mucous surface and capillaries. This change obviously obtains in the diseases just mentioned, and in *scorbutic dysentery*, in which discharges of dark blood frequently take place from both the small and large intestines.

199. vi. PROGNOSIS.—Intestinal hæmorrhage and melæna are generally attended by danger; but much depends upon the pathological states of which they are consequences, upon the amount of the discharge, and the consequent exhaustion. When the effusion takes place early in fever or dysentery, is moderate, or is likely to prove critical, a more favourable opinion may be given; but with some reservation nevertheless. When sanguineous, or black stools, are consequent upon hæmatemesis, or upon hæmorrhage from parts above the diaphragm or pylorus, the prognosis will have strict reference to the related circumstances, and especially to the parts from which the blood appears to have directly proceeded; and will be either favourable or unfavourable accordingly; but, unless when the blood has come from the lungs, in the manner noticed above (§ 99.), or in some alarming states of hæmatemesis, or when there are very obvious visceral disease, and great exhaustion, the danger is much less than in true intestinal hæmorrhage and melæna.

200. vii. TREATMENT.—The stools ought to be attentively examined, in those diseases especially in which intestinal hæmorrhage and melæna are most likely to occur, and still more particularly

whenever faintness or exhaustion after a motion is complained of. For want of this precaution, hæmorrhage from the bowels has been often overlooked, and even fatal syncope has supervened, soon after the patient has been allowed to get upon the night-chair. In most circumstances of disease, in which this form of hæmorrhage is apt to occur, a bed-pan ought to be used, and the sitting or erect posture should not be assumed, until it is allowed by the physician.

201. *A.* The ancients supposed that blood effused in the intestines soon becomes putrescent; and they, therefore, prescribed purgatives to carry it off, and to prevent its injurious effects upon the system. This view of the matter is not without truth; but purgatives ought to be employed with caution, as they are apt to increase the hæmorrhagic state of the bowels, if they be of an irritating or relaxing kind. *Rhubarb*, with *ipeacacuanha* and the *hydrargyrum cum creta*, and spirits of *turpentine* with *castor oil*, are the most safe, appropriate, and efficient purgatives in this disease; but they will often require to be assisted by mucilaginous enemata, or by injections containing these oils. When the liver is much affected, occasional doses of *calomel* may be given with *rhubarb*, or with opium or some other narcotic, as circumstances may suggest. The spirit of *turpentine* was prescribed first by Dr. ADAIR for this form of hæmorrhage, and afterwards by Dr. BROOK in the same year that it was employed by myself in a different quarter of the globe. I have since always resorted to it, and in some very hopeless cases. In a very severe case of *mælæna*, which I saw in 1823, with Mr. CHURCHILL, this medicine was successfully administered after the most powerful astringents had failed. It has likewise been recommended by Dr. W. NICHOLL and Dr. ELIOTSON. It exerts either an astringent, or a purgative effect chiefly, or both, according to the dose and the mode of exhibiting it (§ 176.). It is also very beneficially applied over the abdomen, in the form of liniment, or of warm epithem or fomentation.

202. The other means of cure should entirely depend upon the related pathological states, and upon the nature of the malady, on which this is contingent. If it occur in the course of *puero-dynamic fever* (§ 491.), the means there advised should be employed; if in the progress of *scurvy* or *purpura*, the remedies directed for these diseases, in addition to those now suggested, ought to be prescribed. If intestinal hæmorrhage depend upon structural change of the liver or spleen, the treatment is not materially different from that advised for *hæmatemesis*, in similar circumstances; but when the discharge is profuse, astringents must, in the first instance, be decidedly employed. Of these, the oleum terebinthinæ; the acetate of lead with opium, or with acetic acid and morphine; the gallic, citric, or other vegetable acids; the mineral acids and the metallic salts; the chlorides, especially the chloride of lime; *kreosote*, and the most powerful vegetable astringents should be preferred. — When nervous symptoms are present, camphor may be conjoined with either of these, or with opium; and, when the crasis of the blood, as well as the vital cohesion of the tissues, are manifestly impaired, the chlorides, or the muriate of ammonia, or the

nitrate or the chlorate of potash, &c., may be given with such of the astringents as are congruous with them.

203. *B.* The diet and regimen should be even more rigidly attended to than in hæmatemesis. The former ought to consist chiefly of farinaceous and mucilaginous substances. Fruits and slops are generally prejudicial. Vermicelli, or rice boiled to a pulp, and moistened with beef tea, or veal broth, is generally suitable. Perfect quiet of body and mind, and the recumbent position, ought to be maintained. Wine is sometimes necessary, especially in the circumstances requiring the use of opium. Lime-water, alum-whey, lemonade, imperial, or any of the beverages prescribed in the APPENDIX (F. 588. et seq.), may be employed as the patient's drink. When blood has entirely disappeared from the stools, attention ought to be carefully directed to the excretions and the digestive functions, and the strength restored by mild and light nourishment, the quantity of which should be gradually increased to a very moderate amount. The causes, and pathological states on which this affection depends, ought to receive attention, as the removal or mitigation of these is the most sure means of preventing a recurrence of the attack. When convalescence is not retarded by disease of the liver, then wine with seltzer-water, the preparations of bark, and various tonic astringents may be allowed; but the bowels ought at the same time to be duly regulated. (See also the Treatment of *Hæmatemesis* (§ 174.).)

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VIII. HÆMORRHAGE FROM THE URINARY ORGANS.—*SYN.* *Hæmaturia* (from *alma*, blood, and *opsis*, to urinate.), *Auct. var*; *Sanguis in Urina*, Celsus; *Mictus Cruentus*, Sydenham, Hoffmann, and Juncker; *Mictus Sanguineus*, *Hæmorrhagia ex Viis Urinariis*, *Hæmorrhœa Vium Urinariorum*, Swediaur; *Blutharnen*, Germ.; *Pisement de Sang*, *Hématurie*, Fr.; *Orina de Sangue*, *Ematuria*, Ital.; *Bloody Urine*, *Hæmorrhage from the urinary passages*.

DEFIN.—The urine, containing or consisting of a fluid, grumous, or partially coagulated blood, the colour varying from red to brown or black,

sometimes with small fibrinous coagula, the patient generally complaining of uneasy sensations in the region of the kidneys or bladder.

204. i. The Causes of hæmaturia are—*external injuries* on the loins, hypogastrium or perinæum; falls, or concussions of the trunk; prolonged or severe exercise on horseback; riding in carriages over a rough or broken pavement; violent muscular exertions;—*Internal irritants*, as calculi formed in the kidneys or bladder, and acrid substances taken into the stomach, absorbed into the blood, and carried to the kidneys, as turpentine, cantharides, savine, and various other medicines;—and whatever inflames, or causes congestion of the urinary organs, as the application of cold, the suppression of accustomed discharges, &c.—Hæmaturia may also be produced by the concurrent influence of plethora, venereal excesses, violent fits of passion, &c.; but the most common causes are organic changes implicating the kidneys or bladder; general cachexia, as scurvy and purpura; malignant and exanthematous fevers; and even still more common are calculous formations and the other internal irritants specified above.—This disease is most frequent in males, in persons advanced in life and in the aged; in plethoric habits and sanguineous or irritable temperaments; in the scrofulous and calculous diathesis; in those who pass an indolent and luxurious life, and who are addicted to venereal indulgences, and to the intemperate use of intoxicating liquors.

205. a. *Idiopathic hæmaturia* is extremely rare. CULLEN states that he never met with it. J. P. FRANK rarely saw it. Unless when caused by cantharides or turpentine, it is certainly very seldom observed; and even when thus induced the hæmorrhage is generally scanty, and the consequence of inflammatory irritation. Indeed, hæmaturia is often merely a symptom of inflammation of either the kidneys or urinary bladder, the quantity of blood effused being small.

b. *Supplemental hæmaturia*, or that which is vicarious of the catamenia, or of hæmorrhoids, is equally rare, although its occurrence has been much insisted upon by foreign writers; and it is extremely probable that organic lesion is more or less concerned in the production even of this variety. CHOPPART, however, mentions an instance of hæmaturia consequent upon irregular menstruation, in which the urinary organs presented no change after death.—c. *Critical hæmaturia* is seldom observed, although FORESTUS, ETTMÜLLER, AMATUS LUSITANUS, MARCELLUS DONATUS, ZACUTUS LUSITANUS, HOFMANN, JUNKER, CHOPPART, LATOUR, &c., insist on its importance during inflammatory fevers, and in plethoric persons. They also consider that, of all critical hæmorrhages, it should be the least interfered with. When hæmaturia is actually critical, it seems to depend upon a similar state of local action and of vascular fulness, general or local, to that which obtains in the more idiopathic and vicarious states of the disease.—It is chiefly, therefore, as a symptom of previous disease, local or constitutional, or even of both, but especially of urinary calculi, that hæmaturia is met with in practice.

206. ii. The DESCRIPTION of hæmaturia comprises—1st. The appearances of the urine and of the blood contained in it; 2d. The symptoms attending this morbid state of urinary excretion,

and their relation to the seat of hæmorrhage; and, 3d. The pathological states of which hæmaturia is the consequence.—A. The urine may contain much or little blood; or the fluid evacuated from the bladder may be almost entirely blood. Its colour may be either red, or brownish red, or nearly black or ink. Sometimes the urine is passed *guttatim* with pain and scalding; and with a constant or frequent recurrence of the desire to empty the bladder, although but little or even no urine is contained in it. At others, the blood and urine are retained in large quantity, efforts at evacuation being ineffectual, owing to coagula obstructing the outlet from the bladder or being lodged in the urethra. Even when the obstacle is removed by a sound or catheter, the urine often presents a bloody, sanguineous, or chocolate appearance for several days, although the hæmorrhage may have ceased, and is sometimes extremely offensive from the decomposition of the clots retained in the bladder, or from the action of the urine upon them. Occasionally this fluid is grumous, very dark, or even black, or contains a number of small brown coagula. In some cases, fibrinous substances of various forms and sizes are evacuated, consisting of the fibrine of the effused blood, moulded or changed by the parts through which they have passed. In others, a stringy or gelatinous substance, with dark coagula, or black grumous matter, is observed in the urine; and occasionally mucous, muco-puriform, or gravelly matters are also found.

207. B. The symptoms of hæmaturia vary with the seat of hæmorrhage. (a). When the kidneys are the parts chiefly affected, the attack is usually preceded or attended by chills or rigors; by coldness of the extremities, and particularly of the hands; by deep-seated pain, or a sense of weight, or of tension, or of heat in the loins; by general lassitude; and often by anxiety, or colicky pains in the abdomen; by frequent desire to pass the urine; sometimes by numbness in one or both thighs, and pain in the course of the ureters, or by nausea or retchings. If cantharides or savine have been taken, a burning heat is felt in the urinary passages, with priapism, scalding, and pain on discharging the urine, &c.—(b). When the bladder is the seat of hæmorrhage, a frequent desire, or great difficulty, to excrete the urine; tenesmus, or pain or heat about the anus; a sense of tension or of warmth, with itching above or behind the pubis, or of dragging in this situation; pain or aching in the perineum, frequently with febrile symptoms or nausea, and constipation of the bowels, are complained of. The severity of the local symptoms, as well as the state of constitutional disorder, vary extremely, according to the grades of vital power and of sthenic or asthenic vascular action, and to the organic changes or nature of the local irritation of which the hæmorrhage is a consequence.

208. The above symptoms, especially when they precede the attack, indicate inflammatory irritation or active congestion of the urinary organs. But sometimes the hæmorrhage takes place suddenly, and in great abundance, without any precursory sign. In some cases, also, the symptoms are very obscure. In most of these, however, it will be found that the blood comes from the kidneys, and that its effusion is caused by calculi in these organs. Even when the blood is discharged

from the kidneys, the symptoms may be most severe in the region of the bladder, owing to the irritation and interrupted excretion of the effused blood, or even independently of these circumstances. Indeed the symptoms have not infrequently been referred to the sound or least affected organ, whether the kidneys or bladder. More commonly, however, they indicate the seat of hæmorrhage with much precision, when duly investigated.—Dr. PROUT very justly remarks, that, when the blood is equally diffused through the urine, it generally proceeds from the *kidneys*; and that when it mostly comes away in greater or less quantity at the termination only of the urinary discharge, the urine having previously flowed off nearly pure, it is effused from the *bladder*. In the former case, also, coagulated fibrine in the shape of worms, moulded in the ureter, and subsequently washed out by the urine, are not infrequently met with. When these appear, the diagnosis is unequivocal, especially when they are consequent upon the symptoms above referred to the kidneys, or upon other evidence of the existence of calculi in these organs. On the contrary, when there are symptoms of stone in the bladder, or of other disease of this viscus or of the prostate gland, indications of renal disorder not being present, the bladder may be considered the source of hæmorrhage; and this inference may be likewise drawn, if severe pain above or behind the pubis be complained of; if the bladder become suddenly distended; if the passage of urine be interrupted or entirely obstructed, and if other signs of coagula in the bladder be present, although the external discharge may be small.—When the blood passes, *guttatim*, without urine, it manifestly comes from the *urethra*. It may, however, proceed from the upper parts of the urethra, and flow back into the bladder, and be voided with the urine. Rigors or horripilations not infrequently attend hæmorrhage from this, as well as from other parts of the urinary passages.

209. *Hæmorrhage into the bladder*, from either the kidneys or ureters, or the upper part of the urethra, but more especially from the *parietes of the bladder itself*, may be followed by *coagulation of the blood* in this viscus. This is not unlikely to take place, if the effusion be sudden and copious; and whenever it does, the patient experiences great suffering. When the coagulum is large, it often causes retention of urine; and when it is small, it sometimes becomes the nucleus of calculous formations. The principal *indications of the existence of coagula* in the bladder are pain, distention, and weight, with tenderness or tension above and behind the pubis, with a sense of dragging in this situation, and of aching in the perineum, preceded or attended by the excretion of a small quantity of pure or recently effused blood by the urethra, and frequent desire to pass the urine. When this secretion is retained, distension of the bladder so as to occasion a tumour above the pubis, with tenderness and tension of the hypogastrium and other distressing symptoms are also present. If the urine present, after a scanty discharge of recently effused blood, and more or less of the above symptoms, a brown or chocolate appearance, or deposits a heavy dark sediment, and if frequent efforts to urinate continue, the evidence of coagula in the bladder is still stronger (§ 208.).

210. *C. Duration, &c.*—Hæmaturia may continue a few minutes only, or many hours, or even days. It may *remit or intermit*, or recur at short or very distant intervals. It may be even *periodic*, the attack returning more or less frequently. Periodic hæmaturia is not uncommon in miasmatic climates, and it is, although rarely, even seen in this country amongst those who have been exposed to malaria, or have resided long in warm climates, or suffered from periodic fevers. In a case of this kind detailed by Dr. ELLIOTSON, hæmaturia accompanied the cold fit of ague, and was cured, along with the ague, by the sulphate of quinine. Hæmaturia may be also periodic when it is vicarious of the catamenia or of hæmorrhoids. When it depends upon calculi in the urinary organs, its recurrence may be expected until the cause is removed; when it proceeds from malignant or other organic disease of these parts, it is most commonly persistent, recurring, or severe, or even fatal in its consequences.

211. *D. The Pathological states of which hæmaturia is generally a consequence* have been already noticed, but some of them require more particular mention.—*a.* When the hæmorrhage is consequent upon *inflammatory irritation*, the symptoms referrible to either the kidneys or bladder are well marked, and more or less symptomatic or irritative fever is often present. Fibrinous substances are also generally found in the urine, and the discharge of blood is seldom considerable, and never excessive. Hæmaturia, from inflammatory action of the inner coats of the bladder, is stated by M. REVOULT to have been very prevalent among the French troops in Egypt. It was characterised by pain in the region of this viscus, extending to the glans penis, with frequent and urgent desire to pass urine, the last drops often consisting of pure blood, and their discharge being attended by very acute pain.—*b.* Very nearly the same phenomena are observed when the complaint depends upon the irritation of *calculi in the kidneys or bladder*. When these exist in the latter viscus, mucous or muco-puriform matter, or a gelatinous lymph, is sometimes found, along with more or less blood, in the urine.—*c.* The irritation of a *calculus in the ureter* may occasion hæmaturia; but the symptoms, as respects either the appearances of the urine, or the seat of uneasiness, may not be different from those already mentioned. In some cases, the pain felt in the situation or course of the ureter; the sense of weight, uneasiness or pain in the lumbar region of the same side; and the numbness or cramps of the thigh or leg of that side, will indicate the source of disorder.—*d.* The hæmaturia which occurs in the course of typhoid or putro-adyamic fevers, of scurvy, and of purpura generally arises from *relaxation of the extreme vessels of the kidneys*, and of the urinary mucous surfaces, in connection with *alteration of the blood itself*. In these, the blood is sometimes effused in considerable quantity; but it is never coagulated, although it is occasionally grumous. It is more intimately mixed with the urine than in other circumstances; the excreted fluid being generally dark, and either offensive or soon becoming so.—*e.* Hæmaturia may also arise from *malignant disease of the kidneys, bladder, or prostate gland*, especially fungoid or encephaloid

productions in these organs. In some cases arising from this cause, the hæmorrhage has been excessive, the urinary bladder being distended by fluid and coagulated blood, especially when the effusion has taken place from this viscus, or from the prostate gland. An interesting instance of hæmorrhage into the bladder from fungoid tumours connected with the prostate, where it was necessary to perform the high operation in order to remove large and firm coagula that had formed, is recorded by Mr. CORLAND HUTCHISON (*Lond. Med. Repos.* vol. xxii. p. 128).—In some cases of malignant disease of the urinary organs, the colouring parts of the blood appear as a reddish sediment in the urine.—*f. Softening of the kidneys, or the internal tunics of the bladder* may be followed by hæmaturia, without being suspected during the life of the patient; but these lesions are very rare.—*g. Ulceration of the inner coats of the bladder* very rarely occurs, unless as a consequence of simple cystitis, or of cystitis associated with calculi in this viscus; or without very manifest symptoms of these diseases. In these cases, the hæmaturia is preceded by such symptoms for a longer or shorter period, and the urine has been loaded by mucous or muco-puriform matter.—*h. A varicose state of the veins*, particularly about the neck of the bladder, has been noticed by several writers as a cause of hæmaturia (*Hæmorrhoides vesicæ*, auct. var.), and by some in connection with the gouty diathesis; but this change is very seldom observed.—*i. Other organic lesions* of the kidneys have been mentioned as causes of hæmaturia; but they can be merely suspected during life, unless they be attended by, or consist of, tumours of the organ, and give rise to pain in the loins and numbness of the thigh of the same side, with the appearances of the urine already noticed (§ 208.); and even then, their nature will seldom be fully ascertained.

212. iii. DIAGNOSIS. The urine may present appearances very closely resembling hæmaturia and yet be perfectly free from blood. The internal use of various vegetable substances, especially the prickly pear (*Cactus opuntia*), beet-root, madder, sorrel, logwood, &c., will give a red colour to the urine, that will be distinguished with great difficulty from that produced by blood. The reddish pink hue of the urine in some inflammatory diseases, will hardly be confounded with hæmaturia.—The dark, black, or inky state of the urine, noticed by several writers, may arise either from the presence of blood, or from the principal elements of bile being excreted by the kidneys with the urine, whilst the liver is obstructed or incapable of performing its functions, as in jaundice. Cases in which black urine has been voided, are recorded by RHODIUS, SCHENCK, SAILLANS, BONET, COWPER, RIEDLIN, BARTHOLIN, LOMMIUS, STOLL, NICOLAI, MARCET, E. THOMPSON and myself. GALEAZZI met with it complicated with hæmatemesis. BONET, after recording a case in which the urine had the appearance of ink, states, that he has observed this in hypochondriasis, where it has occasionally proved critical. In a case treated by me fifteen years ago, a perfectly black sediment was deposited after the urine had stood some time. This condition of the urine may be produced either in the way just stated, or in the manner I have explained when detailing the case just alluded to (*Lond. Med. Repos.* vol. xviii. p. 161.)—by sup-

posing the arterial capillaries and secreting apparatus of the kidneys to be relaxed to a degree sufficient to allow red globules of the blood to escape with the excreted urine, the black colour arising from the action of an acid, or of the saline ingredients of the urine on these globules.

213. When blood is present in the urine in any considerable quantity, a portion of it sinks to the bottom of the vessel, and the transparency of the secretion is disturbed. The reddish pink urine without blood is generally clear. A mixture of urine and blood tinges a piece of white rag dipped into it of a red colour. Dr. WATSON observes that, upon boiling urine containing blood, a brown coagulum will be formed, and that the fluid part will regain the natural colour of urine. When the black hue depends upon the presence of bile, it passes to a yellowish or greenish tint upon dilution with water; if it proceeds from blood, a reddish colour becomes apparent, especially if a little subcarbonate of soda be added.

214. iv. PROGNOSIS.—The prognosis must depend chiefly upon the pathological states producing the hæmaturia. If these consist principally of inflammatory action or irritation, or of active congestion, a severe, although not necessarily a dangerous, disease is indicated. If there be evidence of calculi in the kidneys or bladder, a nearly similar opinion may be formed, but much will depend upon the circumstances of the case, and the states of associated disorder, particularly of these organs. If hæmaturia occur in aged persons and broken down constitutions, or if there be reason to infer the existence of malignant or serious organic change in any part of the urinary passages, the prognosis must be very unfavourable. The amount of hæmorrhage is in itself rarely fatal, although the retention of coagula in the bladder is always dangerous, and often fatal, from the consequences which result, particularly as respects the excretion of urine. When hæmaturia appears in the course of adynamic, continued or exanthematic fevers, or in purpura, &c. an unfavourable opinion of the result should be entertained.

215. v. TREATMENT.—*a.* When bloody urine proceeds from inflammatory irritation or active congestion, or is supplemental of some other sanguineous discharge, and especially when it is attended by severe pain or symptomatic fever, or increased vascular action, bloodletting, and particularly cupping on the loins, or perineum, according to the seat of the chief affection, should be practised. In these, as well as in other circumstances, demulcent diluents, and oleaginous or mild aperients, are more or less beneficial. When acid substances have caused the complaint, these are especially required; and the almond emulsion, the gums, the decoction of althæa, the infusion of linseed, &c. may be abundantly exhibited, either alone or with small doses of camphor, or with paregoric elixir. When the hæmorrhage is induced by calculi, local depletions, and demulcents, conjoined with the opiates or other anodynes, or these latter, either with the alkaline subcarbonates, or with diluted muriatic acid, according to the state of the urine, the warm bath, and emollient enemata, will generally be of service.

216. *b.* When hæmaturia presents a passive character—when it is attended by great debility or vascular asthenia, or supervenes in the course of

the maladies already mentioned, camphor should be given in considerable doses, with small quantities of opium or acetate of morphia. In such cases, also, the tincture of the muriate of iron; or the balsams or terebinthines, particularly the balsam of Peru, copaiba, the Canadian balsam; or the spirits of turpentine in small doses; or the infusion of uva ursi, or of the diosma crenata (F. 231.) may be employed, and conjoined with opiates or other anodynes according to circumstances. FRANK advises cold clysters with vinegar, and tonic astringents internally. Dr. PROUT found an obstinate case of profuse hæmaturia yield at last to a combination of colchicum with uva ursi. Where sabulous or calculous formations are concerned in the production of the hæmorrhage, or when the hæmaturia occurs in the gouty diathesis, this combination, either alone or with the alkaline subcarbonates, seems very appropriate. When the hæmorrhage is so very profuse as to require to be immediately arrested, dry cupping on the loins, the warm bath, or warm pediluvia, spirits of turpentine, given internally and administered in enemata, the superacetate of lead with opium, kreosote, and the other active astringents already mentioned (§ 40. 178.) are the most to be depended upon.

217. c. If *coagula* form in the bladder, the serious consequences they usually induce should be prevented as much as possible by breaking them down by means of a catheter; and by injections of tepid water, or other emollient fluids, containing a small quantity of the subcarbonate of soda, or of potash. This practice has been advised by DESAULX, J. P. FRANK, HOME, LARREY, HOWSHIR, and others; and should not be delayed, or partially or negligently adopted.

218. d. There have been some other means recommended by writers on the disease, but few of them are deserving of notice. CÆLIUS AURELIANUS advised bloodletting, the injection of astringent fluids into the bladder, and the application of cold epithems to the pubis; but considered diuretics to be injurious. SYDENHAM recommended depletion, and astringents with narcotics; BUCHAVE and LOEFFLER, frequent doses of ipecacuanha; GOOCH large doses of opium; MOYLE, SCHOENFELD and others, the terebinthines; BISHOP, the decoction of the leaves of the Persian almond; and J. P. FÄHR, the application of lead or of its preparations over the region of the kidneys.

219. e. The regimen during and after hæmaturia should be directed in conformity with the seat of the disease, and with the principles already developed. The diet should be chiefly farinaceous and mucilaginous; and the beverages emollient and slightly astringent. The waters of Bath, or those of Ems and Carlsbad, or of Selters and Gailnau, or the factitious waters prepared at Brighton, may be tried. When the bowels require assistance, oleaginous purgatives, especially castor and olive oil, are upon the whole the most appropriate, and may be freely administered in enemata. The patient should avoid riding on horseback or in a carriage; but, if the latter cannot be dispensed with, an air-cushion should be used.

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IX. HÆMORRHAGE FROM THE UTERUS. — SYN, Sanguinis Stillicidium ab Utero, Ballônus. Hæmorrhagia Uterina, Juncker, Good. Ham. Uteri, Hoffmann. Menorrhagia, Sauvages, Vogel, Cullen, &c. Fluor Uterini Sanguinis, Boerhaave. Hysterorhagia sanguinea, Swediaur. Metrorrhagia, Sagar, Ploucquet, J. P. Frank. Metro-hæmorrhagia, Auctor. Blutgang, Mutterblutfluss, Gebärmutterblutfluss, Germ. Perte de Sang des Femmes, Perte Rouge, Perte Uterine, Fr. Perdita di Sangue, Ital. Uterine Hæmorrhage, Flooding.

220. DEFIN. — Discharge of blood from the vessels of the Uterus, independent of the menstrual evacuation.

221. From this definition it will appear, that Menorrhagia, or excessive menstruation, should not be confounded with Metro-hæmorrhagia, or uterine hæmorrhage. But it should not be overlooked that the former often passes into the latter. Menorrhagia is treated of in the Article MENSTRUATION: hæmorrhage from the uterus only, legitimately falls under consideration at this place. Metrorrhagia (from μέτρα, the womb, and ῥοιαν, I break forth) has been very generally employed to denote this disease; but it is evident that αἷμα should be interposed, in order to convey the idea attached to this term, and that the name, Metro-hæmorrhagia should be preferred. —

The division of this subject, adopted by M. DUCOS and some others, although considered unnecessary by M. DESORMEAUX, may be here followed with advantage. I shall, therefore, consider uterine hæmorrhage as it occurs—1st. Before puberty; 2d. During nubility, or before the cessation of the menses:—3d. At the critical period of life, and during old age; and, 4th. In connection with the puerperal states, or during pregnancy, and after delivery.

222. i. Hæmorrhage may take place from the uterus, or in a slight degree from the vulva, at any period *previously to puberty*; but this very rarely occurs, unless as a consequence of masturbation, or of premature sexual connection, or of genital excitement. The destructive vice, masturbation, exists much more frequently amongst young females, and is acquired at an earlier age than is generally supposed even by medical men; children of the age even of two or three years, sometimes acquiring it from nurse-maids, or from older children. Two or three instances of this have accidentally come to my knowledge. Both at the infirmary for children, and in private practice, cases of hæmorrhage from the female genitals occurring at irregular periods previously to puberty, have come before me; as well as instances of premature menstruation, the discharge recurring after monthly intervals; and, in every case, a strict investigation has led to the inference as to the cause already stated. Precocious menstruation is much more rare, than uterine hæmorrhage before puberty; the latter, may be distinguished from the former, by the attendant injury to the general health, and loss of the healthy look, and complexion: whereas, the former is accompanied by a more rapid growth of the frame, and by other signs of puberty, as the development of the mammæ, &c.

223. ii. From the 12th to the 16th year, in our climate, the female sexual organs are developed so far as to give rise to the menstrual discharge. But the occurrence of this discharge, at or for some time after the earlier of these years, is not an indication of these organs being capable of performing all their functions, inasmuch as impregnation is rarely effected before fourteen years of age. *Metro-hæmorrhagia, occurring after puberty*, independently of the puerperal states, or menorrhagia proceeding so far as to amount to a true hæmorrhage, is liable to recurrence, at irregular or regular periods. When the hæmorrhage is slight, and returns at the monthly periods, the observations offered when treating of *excessive menstruation* are altogether applicable. But when it is very large, or of frequent, or of habitual recurrence, it is most exhausting and injurious to the system, although it may be entirely independent of any structural lesion. A female may experience only one attack, arising from excessive determination of blood to the uterus, caused by various exciting causes: and, even when the attacks recur, they will be much influenced by diet and regimen. Whenever they return, whether at monthly, at irregular, or at short intervals, or whether the discharge be continued or remittent, especially if the female have been or is married, or has had children, some morbid structure in the uterus should be dreaded, and a careful examination made *per vaginam*. Uterine hæmorrhage at this epoch, unconnected

with impregnation and the puerperal states is, either, 1st. *Sthenic or active*—depending upon determination of blood to, or upon inflammatory irritation of, the uterus; or, 2d. *Asthenic or passive*, arising from impaired tone of the uterine vessels and parietes; or, 3d. *Symptomatic* of organic lesion. But before the phenomena ushering in or attending these states of the disease are described, the causes which induce them may be detailed.

224. A. Causes.—a. The *predisposing causes* which are more especially concerned in the production of this form of uterine hæmorrhage, are the epochs at which the menses first appear and at which they altogether cease; the menstrual periods themselves; general or local plethora; excessive sensibility of the uterus, arising either from original conformation, or from inordinate sexual excitement, or masturbation; frequent or difficult child-bearing, or abortions, especially if they have succeeded each other rapidly; constriction of the abdomen by tight corsets (MAURICEAU, RANOE); too much warmth applied to the lower parts of the trunk and thighs; very hot seasons; the habitual use of exciting liquors, of rich and high-seasoned dishes; and a frequent recourse to warm baths. These predispose chiefly to the more *active* states of uterine hæmorrhage, but the following favour the occurrence of the more *passive* forms;—especially weakness of constitution, general debility, and cachexia; the lymphatic temperament; imperfect or unwholesome nourishment; chronic or excessive discharges, particularly prolonged lactation; the depressing passions, as grief, sadness, anxiety, &c.; and the abuse of relaxing beverages, &c.

225. b. The *exciting causes* are, stimulation of the vascular system generally, or of the uterine organs in particular, by the use of hot baths, of intoxicating liquors, of acrid purgatives, or of emmenagogues, and by excessive sexual indulgence; riding on horseback, or in an uneasy carriage; prolonged dancing; running, or walking too far; lifting heavy weights, and physical exertions of any kind; shocks or concussions of the trunk; falls on the thighs or hips; excitation or irritation of the sexual organs, by injections, pessaries, or suppositories; the more violent mental emotions, as anger, fright, &c. SENNERT refers to a case in which it was induced by a stimulating pessary; and obstruction or retardation of the menses may be the cause of hæmorrhage, independently of any means being used to remove this obstruction, as shown by DESORMEAUX and LOCOCK. It is, also, not unusual for metro-hæmorrhagia to occur within the first fortnight after marriage, especially when this rite has been performed shortly before the period of female indisposition. It has been supposed that sexual congress during this period is apt to induce an attack of this disease. Certain causes, also, may occasion it, by affecting related organs, and thereby acting sympathetically upon the uterus. VAN-DEN-BOSCH adduces instances of it having been produced by worms in the intestines. I have seen it favoured, if not excited, by ascarides. —STOLL and FINCKE observed uterine hæmorrhage unusually prevalent during the bilious inflammatory fever of 1778. GRENDRON, CONRADT, STRACK, and HÖFFNER, remarked it occasionally to attend gastric and bilious diseases; and ZIE-

error conceived that it is not infrequently induced by irritating matters lodged in the bowels. The irritation of the mamma during suckling causes it, in some females. A passive and severe form of the disease has been observed to attend upon epidemics of an adynamic or malignant character; and upon scurvy, and some other cachectic maladies.

226. But however influential and numerous may be the occasional causes of metro-hæmorrhagia, they do not so frequently produce it as *morbid formations in the uterus*, particularly fibrous and other tumours seated in the parietes of the organ, or under the internal lining, polypous productions, hydatids, molés, ulcerations, carcinoma, &c. It may also attend inversion, prolapsus, or other displacements of the womb; or may accompany inflammatory congestion of this viscus, or chronic metritis; and it may even prove a critical evacuation in these affections.

227. *B. Symptoms and Progress.*—These vary with the causes of the hæmorrhage. If the occasional cause be violent, it sometimes follows instantly upon the action of such cause; but, more commonly, a certain interval is observed, during which indications of congestion of the uterine vessels may be observed. In some such cases the attack is so severe as to place the patient's life in jeopardy, particularly if it have occurred during the menstrual period. This form, which may be called accidental uterine hæmorrhage, does not ordinarily occur; but that, on the contrary, which follows the operation of the predisposing causes, is slowly established, and often by a successive increase or duration, or by the more frequent return of the menstrual discharge.

228. The precursory symptoms of an attack sometimes consist only of uneasiness, or colicky pains, as on the accession of the menses; but more frequently the discharge is preceded by some of the following signs—by enlargement, tenderness, or pain of the breasts; tension at the hypochondria; a sense of fulness, weight, heat, throbbing, or pain in the hypogastric and inguinal regions; constipation, or tenesmus with occasional abdominal pains; general lassitude, and a frequent, soft or open pulse. To these succeed pallor of the face, coldness of the extremities, horripilations, the *cutis anserina*, and heat or pruritus of the genitals, followed by the sanguineous discharge, which removes most of the foregoing ailments; but, when the loss of blood has become great for her strength, the patient complains of a sense of sinking or weakness at the epigastrium; and when it is excessive, the lips and face are pallid, the pulse fails, and the eyes grow dim; noises are heard in the ears, and deafness supervenes; respiration becomes quick, laborious or irregular; and faintness, full syncope, convulsions, or even death may take place. But the symptoms do not always follow this course. In some cases, the discharge is less rapid or excessive; coagula form in the vagina; and these restrain the hæmorrhage, and are afterwards expelled by voluntary efforts, before the severer symptoms occur. In delicate or nervous females, convulsions or other nervous symptoms may appear early, or before much blood is lost. Violent headache, especially towards the occiput, is a very common attendant, and generally continues long

after the hæmorrhage has ceased. If the discharge, without being excessive and rapid, recurs frequently, or is moderate but continued, or merely remits, the patient complains of pain and sinking at the stomach, of extreme languor and exhaustion; the pallor is extreme, the eyes are surrounded by a livid circle; the ankles become cedematous, especially towards night; various nervous symptoms appear, and serous effusions into the shut cavities occasionally occur. Metro-hæmorrhagia may appear at first in a sthenic or acute form, and become passive or asthenic from its continuance or recurrence; the effused blood being frequently thin, pale, or dark. It may continue long, or return often, without giving rise to any severe ailment, or merely to some of the foregoing symptoms in a slight degree. When it occurs at the menstrual period, it is often replaced by a leucorrhæal discharge.

229. *C. Diagnosis.*—The disease is so manifest as to the extent of the sanguineous discharge, and the effects thereby produced upon the system, that its diagnosis is a matter of no difficulty. But it is not so easy to distinguish between the causes which produce it, and the states of the œconomy which are induced by it. Yet this distinction, as M. DESORMEAUX contends, should be made, as it directs to a judicious method of cure, and it will generally be made without great difficulty if the attention of the practitioner be directed to the subject, and if the various circumstances causing the attack, and the several phenomena attending it, be passed in review. As to uterine hæmorrhages dependent upon organic lesions of the uterus, it may be remarked, that most frequently they are not passive, even when they proceed from ulceration; but that they are generally preceded by circumstances indicating sanguineous congestion, active determination, or an hæmorrhagic effort.

230. iii. Uterine hæmorrhage, about the period of the cessation of the catamenia, or subsequently to this period, is not infrequent. Menstruation, then, often assumes an irregular form—disappearing for months, and returning in a profuse or truly hæmorrhagic form. Generally this circumstance is unattended by material risk. But if the discharge be very great, or occurs often, or if it appears after the age of fifty or after the catamenia have ceased for many months, or for two or three years or more, there is sufficient cause for alarm, and serious disease of the uterus should be suspected. Such returns of youth, with which aged females sometimes console themselves, are rarely unattended by some one of the structural changes already enumerated (§ 226.). I was consulted, however, long ago in a case of a female above sixty, and otherwise in good health, who had returns of uterine hæmorrhage at nearly monthly intervals. No disease was detected upon examination; and she is now alive and well, and in her 74th year. I was very recently called to a lady 47 years of age who had been subject to frequent returns of uterine hæmorrhage during two years, and who was labouring under a dysenteric attack when I saw her. This latter was soon subdued, when the hæmorrhage, and the cause of it, became objects of attention. An examination was made, and a hard fibrous tumour was found in the os uteri. It was soon afterwards thrown off; but the hæmorrhage re-

turned and symptomatic irritative fever continued. An examination was made some days afterwards, and another tumour was found passing into the vagina. This, which was distinct from the former in structure and form, came away soon afterwards, and the recovery was progressive and complete. In this case, the tumours were most probably developed beneath the internal lining of the uterus, and thrown off, in the course of the treatment which was adopted for the arrest of the hæmorrhage.

231. The symptoms of uterine hæmorrhage at this advanced epoch of life, are not different from those already described (§ 227.). But they are more generally caused by organic lesions of the womb, than uterine hæmorrhage at the preceding epoch, and complicated with the symptoms which more particularly appertain to the associated lesion. Indeed this constitutes the chief malady; the hæmorrhage being only the contingent, but often the more immediately dangerous, or most alarming, occurrence. The consideration, however, of these associated lesions cannot be entered upon at this place. It is fully entertained in the article upon *diseases of the Uterus*.

232. IV. OF PUERPERAL UTERINE HÆMORRHAGE. — Under this head is comprised hæmorrhage during pregnancy or parturition, and after delivery. — The changes that then take place in the uterus, and particularly soon after parturition, sufficiently account for the frequency of metro-hæmorrhagia, at these periods. — During pregnancy there is an actual increase of the vitality as well as of the bulk of the uterus — a state of orgasm of which vital activity and vascular determination are the chief elements. Hence the active nature of the hæmorrhages that take place from it at this epoch. Besides, this viscus contains an organised and living body, presenting intimate relations with it, and opposing certain of the circumstances which favour sanguineous effusions from it. The vascular connection between the uterus and placenta becoming more developed as pregnancy advances, it follows that the detachment of a portion or the whole of the placenta or ovum will give rise to a more profuse hæmorrhage in the advanced, than in the earlier months of this period; but as soon as the uterus has thrown off its contents, and in proportion as the uterus contracts, the disposition to effusion will become less, until it altogether ceases. Hæmorrhage during pregnancy or after delivery may proceed, either from the numerous minute decidua vessels, which connect the ovum to the internal surface of the uterus, and are necessarily torn when the ovum is either partially or altogether separated, or from the semilunar openings seen in the inner surface of the uterus, when the placenta is removed, or from both sources. The opinions of pathologists are divided on this subject; but as long as the exact offices of these openings are undetermined, no precise inference can be arrived at as to this question. However it may be settled, the treatment to be adopted is unaffected by it, inasmuch as the fact is unquestioned, that it is to the partial or entire detachment of the placenta from the uterus, that uterine hæmorrhage, at an advanced period of pregnancy, is generally to be attributed.

233. Previously to the consideration of true

puerperal uterine hæmorrhage, the disputed topic as to the source of the loss of blood occasionally observed in the earlier months of pregnancy may be briefly referred to. This species of discharge has been considered as a true menstrual evacuation from that part of the uterus, to which the ovum has not become particularly attached by means of the placenta, and that it escapes through the imperfectly closed os uteri, owing to the softness of the mucous or albuminous secretion which fills it. But if this were the case, we may reasonably infer, that it would also occur in many instances, in which the os uteri presents a complete obstacle to its exit, and in which it would accumulate and assume the form of internal hæmorrhage. Having met with two or three instances in which I was enabled to inquire into the phenomena attending this kind of discharge, I am of opinion, that it proceeds from the cervix and os uteri, external to the limits to which the deciduous membrane extends; and that it depends upon the active vascular determination, of which the uterus is the seat during the early months of pregnancy. In some cases, this discharge takes place only once, about the usual monthly period, in others oftener; it is generally slight, and of short duration; seldom considerable. It often passes into a somewhat profuse leucorrhœa; and this circumstance indicates that it proceeds from the same seat, and depends upon a nearly similar state of vascular action, as that secretion.

234. Puerperal uterine hæmorrhage is somewhat different as to its causes, prognosis, and indications of cure, in the different periods in which it occurs: — 1st. It may appear before the sixth month of pregnancy, and it is then generally active, or dependent upon vascular determination, or a *molimen hæmorrhagicum*; sometimes mechanical, or owing to a local injury or violence, which has occasioned the partial or general separation of the attachments of the fœtus, and connected with abortion, the risk of which it announces. — 2d. During the three or four last months of pregnancy it may, in some cases, be connected with the same causes, or changes; but it more frequently depends upon the attachment of the placenta upon, or very near to, the mouth of the womb. 3d. It is chiefly to this cause, and to some others about to be noticed, that hæmorrhage takes place during parturition; — and, 4th. It is to imperfect contraction of the uterus, that its occurrence after delivery is to be attributed.

235. Besides these divisions, there is another to which some attention should be directed. This is into internal, and external, uterine hæmorrhage. The former often takes place after delivery at the full time, and after abortions; but its occurrence during pregnancy, and whilst the fœtus and its envelopes fill the uterus, has been disputed. M. DESORMEAUX observes that, in internal hæmorrhage during pregnancy, the blood is effused either between the uterus and membranes, or within the membranes. When seated between the ovum and uterus it depends upon the same causes as external hæmorrhage, but certain circumstances have opposed the discharge of the blood. ALBINUS found the placenta detached, and a large quantity of coagulated blood interposed between it and the uterus; its circum-

ference being firmly adherent, and preventing the escape of the blood. BAUDELLOCQÜE and DESORMEAUX believe that, in rare instances, the external discharge may be prevented by the head of the fœtus pressing upon the neck of the uterus, or by a clot of blood plugging up the os uteri. Hæmorrhage occurring within the membranes is strictly speaking *fatal*; as the blood in such cases comes from the vessels of the fœtus, and generally from a rupture of the umbilical vessels. These forms of internal hæmorrhage (during pregnancy) have been denied by M. DUOES and some others. But the facts adduced by ALBINUS, DE LA MORTE, LEVRET, and BAUDELLOCQÜE indicate, that it actually occurs but in rare instances. M. DESORMEAUX even enumerates the symptoms by which its existence may be recognised. He states that it may be inferred from the presence of the usual symptoms of hæmorrhage without the external discharge; by a sense of weight and of painful tension in the region of the uterus; and by the sensible augmentation of the volume of this organ, generally in an unequal or lobulated form, owing to the effusion occurring exteriorly to the membranes, and being confined to one part. It is obvious, however, that these indications cannot be fully depended upon.

236. *A. Uterine hæmorrhage previous to the sixth month of pregnancy* arises in the manner already stated, from the causes enumerated above (§ 224.), or from means resorted to in order to procure abortion, or from some of the other causes adduced in the article ABORTION. At this period, a certain interval elapses between the action of the cause and the commencement of the discharge, during which, symptoms indicating sanguineous congestion of, or determination to, the uterus are manifested; and when a suitable treatment is then adopted, these symptoms disappear, and hæmorrhage is prevented. The causes of hæmorrhage, during this part of pregnancy, are never more influential than at the usual periods at which the catamenia would have returned if the patient had not been pregnant; and it is during these months, that general or local plethora, and mental emotions, causes so frequently concerned in the production of uterine hæmorrhage, seem to be most injurious. •

237. *B. a. Hæmorrhage at, or subsequently to, the sixth month* is generally owing to the attachment of the placenta on the neck of the uterus, and commonly appears without any obvious remote or exciting cause. It is generally moderate at first, and either subsides spontaneously or after treatment. But it soon returns as before, is more abundant, continues longer, and does not yield so soon to treatment. Hæmorrhage from this attachment of the placenta generally goes on increasing until the child is destroyed, or delivery is effected. Yet it occasionally commences with great violence, and instantly threatens the life of the female. Sometimes it does not occur until near the natural period of delivery; or it appears much earlier, and returns not until then. M. DUOES considers that, when the placenta is attached only partially over the neck of the uterus, or laterally, the dilatation of the neck will occasion only a slight or very partial detachment of it, and a moderate hæmorrhage, admitting of being permanently arrested; but that, when it

passes over a great portion of the cervix and os uteri, the discharge, although moderate at first, will return, with greater violence and frequency, and will at last continue until the uterus is emptied, or until the mother and child perish. And, where the life of the female is preserved, the great loss of blood leaves her in a state of anæmia and exhaustion, attended with severe headachs, sleeplessness, or palpitations, and other sympathetic affections.

238. The period of utero-gestation at which this variety of hæmorrhage takes place, coincides with that at which the relation of the placenta with the cervix and os uteri, to which it is attached, is disturbed, and which is usually from the sixth to the eighth month. But it may occur early in the fifth, or in the course of the ninth. The discharge appears without any obvious cause; but it sometimes is hastened by some effort or physical shock, and is even occasionally attended by a sensation leading the patient to infer, that something had given way in the uterine region. During labour-pains the discharge of blood is always increased, whilst it is diminished by the contraction of the uterus in other cases; and, as parturition proceeds, the placenta occasionally passes before the fœtus, which generally dies if this process is not speedily completed. Upon examining the os uteri in this form of hæmorrhage, it is found thicker and softer than usual, and its orifice is occupied either partially or altogether by a soft spongy body, which must not be mistaken for a coagulum of blood. If a coagulum be detected in this situation, it ought not to be disturbed, lest the hæmorrhage be renewed.

239. *b. But hæmorrhage from the uterus* may occur in the latter months of pregnancy, although the placenta is implanted on the upper part of the uterus. This, however, is comparatively rare. The blood may be effused in small quantity, and may be chiefly internal. When it is in considerable quantity, and the placenta is separated to some extent, uterine contractions are exerted, terminating in delivery, or in a renewal of the hæmorrhage, from which the patient may expire. This form of hæmorrhage may occur without any prematory sign; but it is more frequently preceded by a sense of uneasiness or weight, or of pain in the region of the uterus, and other signs of congestion or of active determination. It is most frequently caused by external injury, fright, and concussions of the trunk.

240. *C. During delivery*, a small or moderate quantity of blood is lost, but is rarely pure, being always accompanied with water and mucus. When true hæmorrhage occurs, it is generally owing to the detachment of the placenta by the unequal contractions of the uterus, or to the situation of the placenta near or upon the os uteri. In rarer cases, it proceeds from rupture of the parietes of the womb; or from rupture of the umbilical cord. In cases of plurality of children, hæmorrhage may supervene in the intervals between the delivery of each. It is then chiefly owing to effusion from the part of the uterus where the placenta of the first child is inserted, owing to a partial or complete detachment of it. When flooding occurs in the first stage of labour, the discharge always ceases when

the uterus contracts, and returns during the intervals between the pains.

241. *D. Hæmorrhage after Delivery.* — This may occur previously to the expulsion of the placenta or subsequently. *a.* When it takes place before the placenta is thrown off, it is usually owing to one or other of the following circumstances, or at least it is met with in connection with them. 1st. To torpor of the organ; — 2d. To a partial detachment of one part of the placenta and undue adhesion of another; — 3d. To irregular or spasmodic contraction of the womb. It scarcely ever proceeds from the chord, unless in cases of twins, when it may possibly take place. But it may arise from laceration of the uterus or vagina. — *b.* After the expulsion of the placenta, flooding generally proceeds from imperfect contraction, or torpor, of the womb. It may, however, be connected with inversion, or with retention of a portion of the placenta, or of the membranes, in the cavity or mouth of the organ; and in a few cases it appears to depend upon active determination of blood to the uterine vessels, as insisted upon by Gooch, after some Continental writers. These states of the uterus, especially flaccidity, may be feadily inferred from a careful examination and observation of the symptoms. Whether the hæmorrhage takes place before or after the expulsion of the placenta, it may be either *internal* or *external*.

242. *c. Internal uterine hæmorrhage*, after delivery, may thus take place before the expulsion of the placenta or afterwards, or it may be favoured by the retention of the placenta or of the membranes, or of both, partly in the neck and mouth of the womb, and partly in the vagina. That this form of hæmorrhage should be early detected and remedied, is of the utmost importance. The uterus upon external examination will be found soft, roundish, and increasing in bulk, so as often to approach, or even to pass, the umbilicus. It may even ultimately attain the dimensions it had just possessed, and be followed by the death of the female, or by a prolonged and difficult recovery. Whenever pallor of the countenance and lips, vertigo or swimings, noises in the ears, a sense of sinking, nausea, or vomiting; a very rapid and irregular pulse, a quick anxious or gasping respiration; restlessness, jactitation, &c. supervene, whilst the lochia are not more than usually abundant, or are diminished, internal hæmorrhage to a most dangerous extent may be inferred; and a careful examination of the abdomen ought to be made. In order to ascertain the cause of the retention of the effused blood, the expulsion of all the placenta and membranes should be proved; as well as the presence or absence of a portion of these, or of coagula, in the os uteri and vagina. At the same time, distension of the uterus by effused blood must not be confounded with the existence of another child in the womb, or with meteorismus, or with a distended urinary bladder, either of which cannot be mistaken if attention be directed to it, and to the existence of the symptoms just enumerated.

243. *d. External flooding* after delivery of both the fœtus and placenta is not to be mistaken, if due attention be paid the patient; for the blood may collect and coagulate in the centre of the bed, in the depression produced by her

weight, and be overlooked, if she be exhausted and carelessly attended. This variety of hæmorrhage occurs in every degree of severity, and is either gradual, draining, and continued; or rapid, violent, alarming and even speedily fatal; or remittent, intermittent, &c. It is accompanied with all the symptoms already noticed in connection with this (§ 228.), and other severe forms of hæmorrhage, and is followed by most of the phenomena caused, by extreme losses of blood, as described in that Article (§ 53. *et seq.*). Whilst *internal* or *concealed* hæmorrhage is almost uniformly dependent upon a total want of uterine action, the *external* form arises either from that state, or from imperfect, irregular, or transient contractions, and from either of these states in connection with vascular determination to the womb. When slight, continued or draining, it may be kept up by the retention of a portion of the placenta or membranes, or of fibrinous coagula, in the uterus. It is important to keep in recollection these pathological states, as upon them the appropriate use of remedies entirely depends.

244. *ii. PROGNOSIS.* — The circumstances which indicate a favourable or unfavourable result in other hæmorrhages, also apply to the different forms of uterine hæmorrhage. But the condition of the uterus, in both the unimpregnated and puerperal states, and the period of gestation, with various other related circumstances, must be considered in reference to particular cases. *A. In uterine hæmorrhage occurring independently of the puerperal states*, the prognosis should entirely depend upon the nature of the causes, the states of the uterus, the severity of the symptoms, the duration of the disease, and the strength of the patient. When it is induced by occasional causes of a passing or accidental nature, danger will arise only from the quantity of the discharge. If it proceed from causes which have modified the constitution, and endowed it with a tendency to hæmorrhage, or occasioned an habitual discharge, the treatment will generally prove difficult or unsatisfactory. That variety, which occurs in girls at the periods of puberty, ceases spontaneously as the menses become regular; and that which takes place at the critical age of woman, also disappears with the monthly indispositions, if the womb be free from organic changes. When it proceeds from these changes, the prognosis should be guarded, even when circumstances admit of it not being unfavourable. In these cases danger may arise from the hæmorrhage, as well as from the nature of the lesion of the uterus; but more frequently this latter is the chief source of risk, unless where the morbid formation admits of removal, as in the case of *polypus uteri*. (See art. UTERUS.)

245. *B. Uterine hæmorrhage during the puerperal states* is often one of the most alarming and speedily fatal of the maladies peculiar to females. According to Puzos, it is rarely fatal before the fifth month of gestation. Experience has shown the justice of the remark; yet I have seen life in imminent peril at this early period. Flooding is the more dangerous the nearer it occurs to the natural period of delivery, whether previously or subsequently to this process. As respects the fœtus, however, the chances of its preservation diminish with the length of the time to the period

of birth.—Hæmorrhage from insertion of the placenta on the neck or mouth of the womb, is always attended by danger, varying with the violence of the discharge, and requires the speedy acceleration of parturition to save either the mother or child. *Internal*, is much more unfavourable than *external*, hæmorrhage. The latter, when slight, is often its own cure, by removing plethora, or vascular determination. But the former has frequently proceeded to a dangerous or even fatal extent, before the medical attendant is made aware of its accession. Moreover, in order to arrest it, the uterus must be emptied of its contents; and this often increases the exhaustion, or causes a further loss of blood. In either internal or external hæmorrhage, when the pulse becomes very frequent (above 120), small, thready, or irregular; the breathing edspirious or gasping; the motions convulsive, with shudderings, or jactitation; or the sinking and anxiety distressing; and if full syncope supervene, notwithstanding the supine posture and low position of the head, great danger exists, and the patient may either suddenly expire, or recover slowly and with great difficulty.

246. iii. TREATMENT.—A. Hæmorrhage from the uterus *previously to puberty* seldom requires more than moral treatment. — B. When it occurs *at or after puberty, independently of the puerperal states* — 1st, The occasional causes should be avoided; — 2d, Means appropriate to the pathological states producing it, ought to be used for its arrest chiefly when it is excessive; — and, 3d, Measures should be directed to prevent its return when the nature of the case indicates that a return is probable. The fulfilment of the first intension will often accomplish the *third*, and will generally promote more or less the success of the *second*. — a. In a great majority of instances, the hæmorrhage is the result of active determination or of congestion; and it is often connected with a chronic or slight grade of inflammatory action. In these circumstances, the discharge ought not to be arrested by astringents or tonics; for I have seen this kind of interference convert a slight and salutary hæmorrhage into a severe or chronic inflammation. Yet it is not always judicious to allow the discharge to continue, inasmuch as the uterus might thereby contract a disposition to hæmorrhage, or to some other disease. It will be better to attack at once the pathological conditions—general or local plethora, or local vascular excitement—upon which the disease depends, by general or local depletions, by internal refrigerants, by a strictly antiphlogistic diet and regimen, and by repose of mind and body. The patient should be placed in a cool and airy apartment, and preserve the horizontal posture on a bed or couch which is neither too soft, nor too warm. The nitrate of potash, vegetable acids, and acidulous fruits should be given from time to time; and the circulation may be equalised by cooling diaphoretics, as ipecacuanha, hyoscyamus, and nitre, with small doses of camphor. Ipecacuanha, in free or frequent doses, is one of the best remedies that can be prescribed; and when bilious colluvies require to be removed, it may be given so as to procure full vomiting, as advised by STOLL, FRIEZE and others. Constipation ought always to be prevented; but heating and irritating cathartics ought to be withheld.

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The tartrate of potash, or of potash and soda; tamarinds, or the supertartrate of potash with the confectio of senna, the inspissated juice of the sambucus, &c., or any of the aperient electuaries in the *Appendix* (F. 82.96.98.), and mild laxative enemata are the most appropriate. *Derivatives*, as warm manuluvia, are occasionally of use, and are advised by HOFFMANN and LORDAT. DUGES and some French practitioners direct the application of cupping glasses on the mamma. When bloodletting has been employed, or is not indicated, *dry cupping* over the loins or sacrum may be resorted to. Opium and other narcotics are most beneficial in the form of DOVER'S powder. It is only in the more urgent cases, that cold either externally,* or in lavements, and other means about to be recommended, need be prescribed.

247. b. If the hæmorrhage has passed into a *chronic*, or into a *passive* state, the foregoing treatment is no longer appropriate. Tonics and astringents are then required; especially the preparations of catechu, or those conjoined with opium as directed by WENDELSTATT; the muriated tincture of iron; the terebinthinates and balsams; the superacetate of lead and opium; the sulphate of alumina or the metallic sulphates; and the other astringents already recommended for other æsthenic or profuse hæmorrhages (§ 40–45). It is in the passive form of the disease that the *seculæ cornutum* seems to be most serviceable. It may be given in decoction or powder. Dr WEDEKIND and SAUTER advise the exhibition of the *Juniperus Sabina*, in doses of from ten to twenty grains of the powder, thrice daily, but it should be exhibited with caution, and its effects attentively watched.

248. c. In *delicate or nervous females*, in whom metro-hæmorrhage soon assumes a passive character, and gives rise to various nervous affections, an early recourse to restoratives, astringents, and sedatives; is often necessary. Camphor, with nitrate of potash and opium or hyoscyamus, in conserve of roses; DOVER'S powder with catechu; the infusion of roses with sulphuric acid and anodynes; the balsam of Peru or of Tolu, in the form of pills, with magnesia, or powdered rhubarb, or ~~small~~ oxide of zinc, and small doses of opium, according to the peculiarities of the case, may be severally employed.

249. d. If the hæmorrhage continue, or become excessive, or occasion exhaustion, or any alarming symptom, the use of cold externally and internally has been very generally recommended. HOFFMANN and LEAKE advise cold fluids to be taken in large quantity; PEZZOLD, very cold clysters, and the external application of pounded ice to the hypogastrium; numerous writers, various cold epithems, on the loins, tops of the thighs, vulva, &c.: and many recent authors, the cold affusion on these situations. But these require much discrimination. They are not always appropriate in the passive states of the disease, and they are serviceable chiefly when the active form has become excessive or dangerous. Yet I have seen recourse to them fail, in some instances, and productive of injury, in others. If resorted to prematurely, they may be followed by inflammatory action in the uterus, peritoneum, &c., or by severe rheumatic attacks.

I have, therefore, had recourse, in extreme or prolonged cases, to the spirits of turpentine, either in a draught, or in an enema, or in the form of epithem or fomentation applied over the hypogastrium, and always with success. — This practice was first adopted by me in 1819, in metro-hæmorrhagia occurring after delivery, and has been pursued by me in other hæmorrhages, whenever it was considered advisable speedily to arrest them. In 1820, I publicly recommended this treatment, and I know, that it has succeeded with those who were thus led to employ it.

250 *e.* When the hæmorrhage is symptomatic of organic disease of the uterus, it is generally prolonged, or returns frequently, and is injurious more from this circumstance, than from its violence at any particular time. It is also often remittent, or periodic, the intervals varying in different cases, but the discharge generally subsides spontaneously after local plethoria or determination is removed, and returns again as soon as the organic change has established vascular fluxion or congestion in the uterine organs. Although merely a symptom of the existing organic lesion, yet its frequent recurrence, and the consequent anæmia, sinking, and serious nervous symptoms, require that it should receive the chief attention in the treatment, — and that tonics, astringents, restoratives and anodynes, should be liberally, but appropriately, exhibited. When the hæmorrhage is symptomatic of ulceration, or of malignant disease, injections, *per vaginam*, with the solutions of the *chlorides*, particularly of the chloride of lime, or with pyroligneous vinegar, or with solutions of *kiéssote* should be resorted to, in addition to the means just mentioned. When it is occasioned by a polypus, or by a tumour on which a ligature may be placed, then this ought to be applied.

251. The third intention, viz., to prevent the return of metro-hæmorrhagia, need hardly be enforced in the accidental form of the disease, but is of the first importance in the constitutional, habitual, or periodic states. In order to fulfil it, the remote causes ought to be removed or avoided, and the patient be placed upon a strict dietetic regimen. Every source of local and of general and mental irritation should be shunned. The horizontal posture ought to be retained as long as possible for some time previously to, and during, the discharge, and, in the intervals only, gentle exercise should be taken in the open air. The food ought to consist chiefly of mucilaginous and farinaceous articles, of easy digestion, and asses' milk, with Seltzer water, as advised by HOFMANN may be used both as a beverage, and as an article of diet. The patient should be kept cool, she ought to sleep on a mattress, rise early, or remove to a couch, and, if she be married, lie apart from her husband. If the hæmorrhage be active and dependent chiefly upon general or local plethoria, a small bloodletting from the arm may be resorted to just before the expected accession of the hæmorrhage, or small and frequent doses of *specuacantha*, so as to occasion either nausea or vomiting, may be tried as directed by HOFMANN, RANKE, HORSY, DAIBRO, and others. — In cases depending chiefly upon debility, the preparations of cinchona, of iron, or of other tonics, the cold plunge

or shower bath and salt-water bath, the mineral waters of Tunbridge or of Bath, the factitious waters of Pyrmont, Spa, or of Seltzer, and a light diet, will be of great service. When the recurrence of the discharge is owing to organic lesion, cold bathing is inappropriate, and the mineral waters just mentioned require to be tried with circumspection. Those of Ems of Calsbad, or of Mauterbad, however, will often be employed with benefit.

252 *C Treatment of puerperal metro-hæmorrhagia* — *a.* Previously to the sixth month, uterine hæmorrhage should be treated altogether as described in the article *ABORTION*. If the fœtus and membranes have entirely come away, and the discharge continue from a passive state of the uterus, the exhibition of spirit of turpentine in an enema, will rarely fail of arresting it, but the practitioner should ascertain that no part of the placenta or membranes remain in the uterus or vagina, causing irritation and prolonging the discharge. When the uterus is thus inactive, after abortions, the *secale cornutum* or *borax*, or the spirits of turpentine may likewise be exhibited to procure its contraction.

253 *DESORMEAU* considers that hæmorrhage may take place in the early months of pregnancy, so as partially to detach the placenta, but that the clot that is formed between it and the uterus will often arrest the hæmorrhage and adhesion of the detached portion subsequently occur, and he refers to a case by *NOODIN*, in support of his opinion. On this ground he advises having recourse, at the earlier periods of gestation, to plugging the vagina, as recommended by *LYNOUX*, after bleeding and the usual means of arresting the hæmorrhage have failed (See *ABORTION*, § 26 et seq.) At these periods, the uterus is still more or less unyielding, and the resistance to further effusion is considerable. But, in slight attacks, or at the commencement, the obstacle afforded by the plug may hasten the complete detachment of the ovum, by favouring the accumulation of blood between it and the uterus, and either a copious internal hæmorrhage may thereby be produced, or the ovum, being detached, may be prevented by it from being thrown off, and be retained for a long period, keeping up irritation and hæmorrhage, or a continued draining with occasional exacerbations, or a putrid discharge. Indeed, this occurrence is not rare in the early months, independently of the plug, although the use of it before the expulsion of the ovum, and when the os uteri is soft or yielding, is more likely to occasion than to prevent it. When, however, the os uteri is firm, and the discharge copious, it is often of service, but it is chiefly after the ovum is expelled, in cases of flooding before the fifth month, that plugging is most efficacious, if efficiently employed. Care should be taken that the plug do not press injuriously upon the urethra. Mr. *INGLEBY* directs that it should remain undisturbed for twenty-four hours or longer, but the super-vention of internal hæmorrhage should be kept in view, and the case carefully watched.

254. When the blood escapes in small quantity only, and there are no pains present, and no disposition in the os uteri to dilate, the constitutional powers being unimpaired, an attempt should be made to prevent a return of the dis-

charge, by the means already described both in this article and in that on *ABORTION*. But, as Dr. R. LEE justly remarks, where the flooding is profuse at first, or is renewed with violence, in spite of efforts to check it, the continuance of pregnancy to the full period cannot be expected, and it will be of no avail to take blood from the arm, and to administer internal remedies with any other view than with that of arresting the discharge, and thereby averting danger. In these circumstances the speedy evacuation of the uterus is the chief indication, as the slightest cause may reproduce the hæmorrhage, in an alarming manner, whilst the partially detached ovum remains. But, in the early months of pregnancy, this intention is not so easily accomplished, as at later periods. *Puncturing the membranes in order to excite the uterus* is advised by RIEB, R. LEE, and MERRIMAN; but, before the fifth or sixth month, this may not be easily performed; and, until the sixth or seventh, the hand, however small it may be, will not readily be admitted into the uterus. The *ergot of rye* has been recommended by NEALE, NEGRI, RYAN, and numerous American as well as European practitioners, in order to procure the contraction of the womb in such cases. It may be given in powder, or in decoction, with three or four drops of the oleum *Pulegii*, as advised by Dr. RYAN. I have prescribed it successfully both alone and with from ten to twenty grains of the sub-borate of soda. An enema, containing an ounce or an ounce and a half of spirit of turpentine may be thrown up, if these fail. A judicious recourse to these means will generally supersede the use of the plug or puncturing the membranes, the propriety of which latter before the sixth month is denied by Mr. INGLEBY and some others. Wherever, in such cases, the end can be obtained by the use of medicine, recourse to any operation, however trifling, should be avoided. Instances, however, may occur about the fifth or sixth month, in which perforating the membranes is required, in addition to the other means just advised. The cold affusion or the dashing of a wet napkin against the external parts, or the application of the turpentine epithem on the hypogastrium, may be also resorted to, when the case becomes urgent.

255. *b. When in the third or fourth months, the hæmorrhage is continued, draining or remittent, a merely partial evacuation of the uterus should be suspected, more especially if the discharge become offensive; or, if the fœtus with the whole of the appendages have been ascertained to have come away, a flaccid or relaxed state of the uterus may be inferred.* In such cases, a careful examination will discover one or other of these states, which will generally be removed by the medical means just advised, and especially by the exhibition of the spirit of turpentine by the mouth, or in enemata. The recommendation of Drs. HAISSON and BLUNDELL to inject the uterus with astringent fluids, if at all advisable, is most likely to be serviceable in cases where a portion of the ovum has been retained in the uterus, and is passing into decomposition.

256. *c. Hæmorrhage after the sixth month, although occurring most frequently from attachment of the placenta upon the cervix uteri, may also take place when this does not exist.* In this

stage of pregnancy, as well as at earlier periods, if the discharge be in small quantity or moderate—if it have not proceeded with much rapidity—if it stop soon—if no large clots be formed in the vagina—if the cervix have its usual feel, showing that the placenta is not attached there, and that no large coagula are retained in the os uteri—if the child be still alive—if there be no indication of the accession of labour—and if the discharge become pale and watery—we may conclude, with Dr. BURNS, that the full period of gestation may be reached. In this case, the treatment already directed in active hæmorrhage ought to be adopted. But where the effusion is profuse, or continues, and the strength of the patient is impaired by it, the fœtal membranes should be punctured, the liquor amnii evacuated, and the uterus roused to action by the means just advised (§ 254.), aided by frictions over the hypogastrium, and by dilation of the os and cervix uteri.

257. *d. When the placenta is attached over the cervix uteri, as evinced, on a careful examination, by its fibrous vascular structure; by its adhering to one part of the uterus, and being separated at another; by the renewal of the hæmorrhage during labour pains; and by its occurrence without any obvious exciting cause, the utmost decision and dexterity on the part of the practitioner is required.* If flooding occur to an alarming extent in the seventh or eighth months, an examination should be instantly made, and while the blood is actually flowing. In some cases, where a small portion of the placenta lies over the os uteri, coagula may close the orifices of the bleeding vessels, and the patient may go on to the full time. In these, the hæmorrhage is seldom very profuse; and this result cannot be expected. The general recurrence and increased violence of the effusion, until the patient either expires, or is delivered by art; demand that a rule of practice should be laid down; and the rule first devised by LEVER, and now generally received, is the *speedy performance of artificial delivery*. Dr. R. LEE states that he has seen only one case of flooding from the position of the placenta, followed by recovery, without artificial delivery; and, in order to accomplish this, he recommends the hand to be passed into the vagina, as in turning, without waiting for the pains of labour, or the dilatation of the os uteri, and carried steadily forward through the os, in a conical form, between the uterus and placenta, at the part where their separation has taken place. The membranes are then to be ruptured, and an inferior extremity of the child brought down, and the infant and placenta slowly extracted. The hand, however, should not be forcibly introduced whilst the os uteri is rigid and undilatable. Until it becomes soft, the flow of blood should be checked by the recumbent posture, by cold applications and the plug. But this latter ought not to be inserted when the os uteri is soft and dilatable. In the rigid state of this part, in hæmorrhage from this cause, it will command the effusion, until the operation of turning can be safely performed; but, as soon as this may be attempted, it becomes inadmissible.

258. *e. If flooding occur during the first stage of labour, at the full time, the membranes should be immediately ruptured, as recommended by CLENGER, PIZOS, KOK, RIEB, BAUDER-*

LOCQUE, DENMAN, MERRIMAN, D. DAVIS, BLUNDELL, LEE, RAMSBOTHAM, SWEATMAN, and others; but if the discharge should still continue, and the pains become more and more feeble, and the patient exhausted, delivery must be accomplished by turning, by the forceps, or even by embryotomy, according to the circumstances of the case. In less imminent cases, the ergot of rye and other means already mentioned (§ 264.) may be tried before recourse be had to these operations. Mr. INGLEBY, however, considers that many of this description of cases are occasioned by the injudicious use of the ergot; but, when it is employed for the arrest of the discharge, and for the purpose of procuring uterine action, this objection does not apply either to it, or to other means intended to exert a similar operation. After the liquor amnii has escaped, the os uteri still remaining rigid, there are objections to the exhibition of the ergot: and in such a case, plugging the vagina, as advised by BURNS, DEWEES, CAPURON, GARDIEN, DAVIS, &c., may be resorted to, with the aid of friction and moderate pressure on the abdomen in order to increase uterine action. The possible occurrence, however, of internal hæmorrhage should not be overlooked; and if this take place, the still more active interference just mentioned must not be delayed. But the plug should not supersede rupturing the membranes when flooding occurs at the commencement of labour at the full time.

259. *f. Hæmorrhage after the birth of the fœtus*, and before the expulsion of the placenta, is frequent and often sudden and profuse. In this case, strong pressure should be made over the hypogastrium in order to excite uterine action. A binder ought to be firmly applied over the abdomen, several folded napkins being placed under it, so that the fundus uteri be compressed. Dr. R. LEE advises the hand afterwards to be introduced to remove the placenta, but the removal of it should not be attempted until contraction of the uterus commences. After contraction, and the expulsion or withdrawal of the placenta, he directs the perineum to be wet with cold vinegar and water to be applied to the external parts, cold acidulated drinks to be given from time to time, and the patient to be preserved for two or three hours in a state of perfect repose. This plan will generally succeed when the hæmorrhage and retention of the placenta are caused by inactivity of the uterus. But when irregular action of the organ, or spasmodic contraction of the *os internum* or *externum uteri*, retains the placenta either altogether or partially, and thus causes internal hæmorrhage, additional means, especially the exhibition of opium by the mouth, are required. The passage of the hand, in order to remove the placenta, then demands caution and perseverance. If it cannot be accomplished, the turpentine enema, or embrocation, will generally aid in removing the difficulty. If the flooding arise from morbid adhesion of a portion of the placenta, the adhesion must be separated by the hand, in a manner that will readily suggest itself. Dr. T. RAMSBOTHAM attributes these adhesions to partial separation of the placenta during pregnancy, from some accidental cause, followed by a slight discharge, the extravasated blood exciting inflammation of the separated surfaces

with effusion of lymph, and consequent agglutination of them. This opinion is probably correct.

260. *g. Flooding after the expulsion of the placenta* requires a modified practice according as it arises. — 1st. From atony of the uterus; — 2d. From imperfect or remitting contractions; — 3d. From a portion of the placenta left in the uterus: — and, 4th. From inversion of the organ. As in hæmorrhage previously to the complete expulsion of the placenta, so in this the blood may be retained in the cavity of the viscus, by coagula, or by a portion of the secundines lodged in the os uteri or vagina. In every case, therefore, the state of the uterus and the integrity of the placenta should be ascertained. — Where simple atony of the uterus is the chief cause, constant and well directed pressure on the fundus uteri, especially by the hand, the sudden application of cold, or effusion of cold water; the turpentine enema, or draught; the ergot, &c.; are the most efficacious means. If the hæmorrhage be internal, from any of the causes just stated, the same measures will generally procure their removal, by contracting the uterus; but if these fail, they should be removed by the hand. The draining or recurring hæmorrhage, the expulsion of clots, the offensive nature of the discharge, and the constitutional effects consequent upon the presence of a portion of the placenta in the uterus, demand at first the same means as other states of the disease; but afterwards, and particularly when serious constitutional symptoms supervene, indicating a remarkable diminution, and marked vitiation, of the vital current, additional or other remedies should be employed. Weak solutions of the chloride of lime, or of soda, should then be injected *per vaginam*, or even into the uterus; and the decoction of cinchona with the chlorate of potash, or with muratic acid; camphor in frequent doses; an occasional enema with spirits of turpentine, or draught with the same and castor oil; the sub-borate of soda, and other means calculated to support the vital energies, to increase the excreting functions, and to enable the uterus to contract and discharge the matters retained in it, should be prescribed.

261. The occurrence of hæmorrhage after delivery, whilst the uterus appears to be contracted, upon which Dr. GOOCH has so unnecessarily insisted, is nothing more than its connection with an imperfect, remitting, or irregular contraction, in some cases, and with determination of blood in others; states previously known to the profession, and requiring, at most, but a modification only of the means insisted upon in the course of this article. In these, as well as in other cases, the application of pounded ice has been much praised; but the continued application of great cold is less beneficial than the shock produced by the effusion of moderately cold water, or by dashing a wet napkin upon the hypogastrium and external parts. Indeed the former may cause an imperfect or irregular contraction to pass into a state of relaxation, and thereby perpetuate the hæmorrhage. With respect to the hour-glass contraction of the uterus, insisted upon by Dr. BURNS and others, in connection with flooding, the perspicacious remarks of Dr. MALINS should be borne in mind. This acute physician observes that, as the contraction

of the uterus in the unimpregnated state, dividing it into two portions, disappears under gestation, the whole uterus then forming but one spheroidal cavity, so the removal of the distending causes allows the organ to recover, in a great degree, its original shape during contraction, and that thus two cavities again exist in some measure, divided by that contraction usually denominated the os internum uteri, perfectly natural indeed in character, but to which the name of hour-glass contraction as denoting a preternatural state, has been in error so constantly applied. The contraction of the circular fibres, which thus takes place, dividing the upper part of the genital canal into two chambers, when excessive, the other portions of the organs being relaxed, is not infrequently associated with hæmorrhage either whilst the placenta is still retained in the upper chamber, or after it has been thrown off, coagula filling the lower cavity, formed by the cervix uteri. The introduction of the hand into the uterus in order to excite it to action, or to press upon the part to which the placenta was attached as advised by Dr. Gooch and others, can seldom under judicious management, be necessary; and it is very doubtful if it will ever prove serviceable. Plugging the vagina, after delivery at the full time, requires the utmost caution and constant watching, even when the uterus is firmly contracting, as it may favour dangerous internal effusion.

262. *D. The management of a patient after dangerous uterine hæmorrhage* constitutes an important part of the treatment. Although the uterus is firmly contracted, and the patient seems comfortable, yet she ought not to be considered as altogether safe, as the uterus may again relax and the hæmorrhage return. This contingency ought to be guarded against by applying a proper binder, by perfect repose, and by a full dose of opium, if irritability or restlessness exist. Her position ought not to be changed for several hours, and the horizontal posture must not be departed from on any occasion. The room should be darkened and well ventilated, and nutrient but light fluids, in moderate quantity, should be given at stated intervals.

263. *IV. THE PARTICULAR MEDICAL MEASURES ADVISED BY AUTHORS FOR UTERINE HÆMORRHAGES* require but little notice, after the full exposition of the treatment given above. — *a. Vascular depletions*, either general or local, are directed by several writers, and particularly by SCHENCK, LEFEVRE, and PELARGUS; but they are admissible only in the more active states, and as means of prevention, especially in these. When practised so as to derive from the seat of hæmorrhage, some advantage may accrue from *local depletions*, more especially from cupping over the sacrum or under the mammæ, as advised by HIPPOCRATES and ACTUARIUS. Several of the ancients resorted to cupping on the breasts; GALEN directed this operation to be performed over the hypochondria; and GONDRET prescribed *dry cupping* with large glasses, between the shoulders. *Emetics* have been prescribed in order to derive the circulation from the uterus, after bloodletting has been resorted to, by STOLL, GENDRON, REIDLIN, and KORTUM. CONRAD employed them to procure contraction of the uterus, and the expulsion of coagula in uterine hæmorrhage after delivery. They are

certainly serviceable in some cases, but they require discrimination, and their effects ought to be carefully observed.

264. *b. Internal refrigerants*, particularly nitre and cold drinks, have been praised by several of the older writers. MM. MARTINET and DESLANDES have recently given the *nitrate of potash* in remarkably large doses — as much as six drachms in the twenty-four hours. It is not appropriate in cases of puerperal hæmorrhage, although it is sometimes of service in the active forms of the disease unconnected with pregnancy. I have given it in hæmorrhage after abortion, but with little or no benefit. The *muriate of ammonia* is more likely to be serviceable, especially in cases of debility, and when the discharge is draining or remittent. It may then be given with cinchona, or small doses of opium.

265. *c. Of the application of cold*, little further need be stated. It has been generally prescribed by writers from HIPPOCRATES to the present time. COLLOMB, DOEMLING, GAUTHIER, HIENSIUS, CHAUSSIER, and most modern authors, recommend it both internally and externally, in the forms of epithem and injection. RANOE, LOEFLE, JOSEPH, D. D. DAVIS, and OLIVIER, direct cold drinks; whilst FILLIZ and THOMANN consider cold in any form inappropriate in uterine hæmorrhage after delivery, and in the passive states of the disease. There is much justice in this. The recourse to cold requires great discrimination; for, if too long applied, or if the cold be too great, much mischief may be produced by it. The sudden and temporary application of cold, so as to produce more or less shock to the frame, is certainly more beneficial, and more generally appropriate, than a prolonged recourse to it.

266. *d. Astringents* have been very generally administered both by the mouth, and *per vaginam*, in metro-hæmorrhagia. *Aluminated whey* has been prescribed by LENTIN, PASTA, MÜLLER, LINDT, STROEM, and HÜFELAND. THILKINUS has directed it to be employed topically, by means of a sponge. WENDT and ASKOW have recommended the *sulphuric acid* with laudanum; GEBEL the tincture of *muriated iron*; and FOTHERGILL, CARRON, and WENDEL have recommended preparations of *kino*, or of *catechu*. These medicines are even now in general use, but are most beneficial in the more passive states of the disease, unconnected with pregnancy or childbirth, and when the discharge is moderate and prolonged. Of the numerous astringents mentioned by writers, the *supercetate of lead*, in doses of two grains to six or seven, repeated according to the urgency of the case, has been most praised by modern authors, and especially by REYNOLDS, HEBERDEN, MITCHELL, YOUNG, WILLIAMSON, AMELUNG, THOMSON, &c. When the flooding is profuse, or occurs in connection with childbirth or abortion, only the most energetic astringents and the most rapid in their effects ought then to be given internally; and of these, the *spirits of turpentine*; the *ergot of rye* (SPAZZANI, CABINI, &c.; in *Ann. Univers. di Med.*, 1830); and the *supercetate of lead*, in large doses, with opium in *acetic* or *pyroligneous acid*, are most deserving of notice.

267. *e. The more energetic tonics*, in large doses, have likewise been directed. They are appropriate in cases of debility, when the discharge is

prolonged without being excessive; and when it is unconnected with pregnancy or active determination to the uterus. In these circumstances, and when the disease is periodic, the preparations of *cinchona* have been prescribed by STROEM, STARKE, DUNCAN, BANG, PICQUE, &c.; the tincture of *cinnamon* by PLENCK, VOGEL, and SCHNEIDER; and the *sulphate of iron*, and other chalybeates, by RATH, THILENIUS, and DOEMLING. The *sulphate of quinine* with sulphuric acid and tincture of cinnamon, or with sulphate of iron in the form of pill, will be given with advantage in many cases of this description.

268. *f. Ipecacuanha* in small doses has been much used by PAULISKY, DE MEZA, BRUCK, HOLST, LOEFFLER, STOLL, DALBERG, DENMAN, and others; and small quantities of *tartar emetic* have been recommended by CHALMERS. The former of these may be useful when the uterus contracts irregularly, and when the placenta is retained from this cause. But it is chiefly in combination with opium, or in frequently repeated doses, that any advantage can be expected from it. In hæmorrhage after delivery, but little benefit will be derived from opium, especially if given in large quantity, or depended upon chiefly. When thus exhibited it will rather impair than promote the contractions of the uterus. Yet circumstances will sometimes arise to justify the praises of opium expressed by HORSTIUS, HEISTER, YOUNG, SMELLIE, RANOE, CHESNEAU, and GARTHSHORE, especially in uterine hæmorrhage unconnected with pregnancy, or in that occurring in the earlier months of gestation. In these cases it may be given with dilute sulphuric acid (AASKOW); or in *clysters*, as directed by Mr. COPLAND. HARCCKE advised it to be used in injections thrown into the vagina — a method by no means to be advocated; and every practitioner of experience will be aware of the danger of administering opium, unless in very small quantity, in the form of enema.

269. *g. In passive metro-hæmorrhagia*, particularly when the powers of life are depressed or exhausted, brandy or other spirits have been resorted to by many practitioners, often in large quantities. The states of this description are apt to give rise to a very serious affection of the head, and to protract convalescence. *Ammonia*, or *camphor* (ETTMÜLLER), is less objectionable in such circumstances; and a judicious recourse to spirits of turpentine, as advised above, is much more efficacious, and less hazardous. Of other internal medicines recommended by writers, no further notice than the simple enumeration of them need be taken. The *fungus militensis* has been mentioned by LINNÆUS; the *bursa pastoris*, by DE MEZA; the *geum urbanum*, by STROEM; the decoction of the fruit of the *hippocastanus*, by HUFELAND; *taunin*, by CAVALIER; *savine*, by RAVE, FRIEST, and WEDEKIND; *purgatives*, by LENTIN, STRACK, and CONRAD; and the *pimpinella*, by RIEDLIN. Whatever effects these may produce in the hæmorrhages occurring independently of pregnancy, but little benefit can be expected from them in those supervening during the puerperal states.

270. *h. Various external means of arresting flooding after delivery* have been adopted, and frequently with success. *Friction of the abdomen*, particularly when the uterus contracts either

imperfectly or irregularly, and *compression* over the fundus of the organ by the hand, or by *compresses*, *bandages*, &c., have been very properly insisted upon by LEVRET, TALLONY, ZELLER, VOGEL, SMELLIE, OSIANDER, INGLEY, RAMSBOTHAM, R. LEE, and by most modern writers. LOEFFLER directed that pressure should be made by means of a sand-bag. Dr. D. DAVIS and Dr. BRATBY have recommended *bandages* constructed on purpose. Pressure on the descending aorta, through the abdominal parietes, has been favourably mentioned by LATOUR and INGLEY. PLOUQUET advised the pressure to be made by the hand introduced into the relaxed uterus; and EICHELBERGER has adduced an instance of the success of this method. *Injections* of various kinds into the uterus have been employed. PROSPER ALPINUS, THILENIUS, and ASTA prescribed the mineral acids much diluted; GALEN, the juice of the plantago; ASTRUC, diluted vinegar; and KOK, astringent infusions, in this way. FIEUZ directs the hand wet with vinegar; WENDELSTATT, lint moistened with much-diluted sulphuric acid; and M. GORAT, a decorticated or divided lemon, to be passed into the uterus.

271. *i. Plugs or tampons*, moistened with various astringent fluids, have been very generally resorted to since the praises bestowed on them by A. PAREY, HOFFMANN, LEROUX, THILENIUS, THIGEN, IELD, LOEFFLER, HUMBERG, and SMELLIE. Some modern British authors have, however, supposed, that the addition of astringents is unnecessary, although they approve of the plug in nearly the same circumstances in which I have recommended it above (§ 253.), namely, when the os uteri is rigid. Soft lint or sponge may be used; but in such a manner as to fill completely the upper part of the vagina.

272. *k. When all other means have failed* — when the face is blanched; respiration is scarcely audible, or gasping or hurried; the pulse almost imperceptible or gone; the extremities cold or clammy; the power of deglutition lost — *transfusion* should be resorted to, although the chances of success from it are few. Dr. HAMILTON has, however, seen recovery take place from this state by the ordinary means; but so fortunate an issue is rare. The question only is, whether the practitioner should still persist in the use of some of the more appropriate means, or have recourse to transfusion. The contingencies of resorting to it ought not to be kept out of view; for, if air pass into the vein, immediate death will follow. Phlebitis may even supervene although the operation has succeeded, and carry off the patient. The propriety and success of this measure have, however, been so far established by Dr. BLUNDELL, INGLEY, and by some others, who have attempted it in circumstances of more doubtful propriety, as to justify the having recourse to it as an *ultimum sed anceps remedium*.

273. *l. The prevention of uterine hæmorrhage*, particularly in the puerperal states, is a subject of great importance. In the early months, the precautions recommended in the article on ABORTION (§ 26. et seq.) should be adopted. In order to prevent hæmorrhage after delivery, Dr. BRATBY and others advise an appropriate binder to be passed loosely round the abdomen, and drawn tight as circumstances may require. I am con-

vinced that a moderate degree of pressure on the parietes of the abdomen after delivery is of service in preventing not only uterine hæmorrhage, but also some other diseases, especially the different forms of puerperal fevers, &c.

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274. X. OF HÆMORRHAGE INTO SEROUS OR SHUT CAVITIES.—Owing to the organisation of serous membranes, hæmorrhage very seldom takes place from them; the vessels with which they are supplied rarely experiencing that degree of relaxation admitting of the exudation of blood, or even of a portion of its colouring particles. When blood is effused into cavities formed by serous membranes, it proceeds from one or other of the following sources:—1st, From the rupture of an aneurism;—2d, From the erosion, ulceration or rupture of an artery or vein;—3d, From rupt. or laceration of an organ or part;—4th, From relaxation of the vital cohesion, with which the serous tissues and extreme vessels are endowed;—5th, From deficient crasis, or other

changes in the blood; — and, 6th, From the co-existence of the last two conditions. Hæmorrhage may occur from the first, second, or third of these causes, without any manifest indisposition, or disorder sufficient to induce the patient to resort to medical advice; but it never appears as the consequence of the other pathological states, unless in the advanced stage of the most dangerous, depressing, or malignant maladies. When the hæmorrhage occurs from the former of these, it is often to a very great amount; but it very rarely is excessive when it proceeds from the latter states. In all, the existence of the extravasation is to be inferred from the presence of the *constitutional symptoms* (§ 25.), usually produced by profuse hæmorrhages. When the states of vital power and of the blood cause sanguineous exudation into the shut cavities, ecchymoses or petechiæ in other parts of the body, and hæmorrhage from mucous canals, are very generally also observed.

275. i. HÆMORRHAGE FROM THE SEROUS MEMBRANES OF THE BRAIN OR SPINAL CHORD very rarely occurs, unless as a consequence of concussions or injuries of the head or spine; or from violent exertion, particularly in warm weather, or under a hot sun. Sanguineous effusion between the membranes may, however, follow the rupture of small superficial aneurisms or varices, and the growth of malignant or other tumours, or the occurrence of ulceration, implicating the membranes. Hæmorrhage in these situations cause apoplexy and paraplegia, or other comatose and paralytic states. I have seen very slight effusion in the spinal canal in a case of tetanus; and Dr. THOMSON observed it in a case of rabies. BONET, MORAGNI, and OLLIVIER, have seen effusion simultaneously between the membranes of the brain and spinal chord. (See arts. APOPLEXY, BRAIN (§ 26.), PALSY, AND SPINAL CHORD.)

276. ii. HÆMORRHAGE INTO THE PERICARDIUM may take place without rupture of the heart or large vessels within the pericardium, although more or less manifest rupture is the most frequent cause. — Rupture of the parietes of one of the *ventricles* of the heart has been observed by SALZMANN, MORAGNI, MORAND, PORTAL, CORVISART, LAENNEC, and several others enumerated in the subjoined references. In the larger proportion of these cases, the pre-existent lesions which occasionally give rise to rupture have existed. (See art. HEART.) But rupture of the coronary artery (VINDT), of the vena cava (WRIGHT), or of one of the pulmonary veins, or of an aortal aneurism, or perforation of the aorta (FIONATI), within the pericardium, may be the source of hæmorrhage. Several instances of these are referred to below. Blood may also be effused, or rather exuded into the pericardium, in greater or less quantity, or mixed with more or less water, without laceration or rupture of any vessel. Cases of this kind have been observed by VATER, BAADER, SANDIFORT, DE HAEN, THOMSON, HOOPER, myself, and others (see references); and occur chiefly in the advanced stages of adynamic, scorbutic, putro-adynamic, or malignant diseases. Sometimes the blood is poured out between the layers of the pericardium, forming sanguineous vesicles or ecchymoses. (MORAGNI, DE LA

FAYE, STOLL.) When hæmorrhage into the pericardium arises from any of the kinds of rupture just enumerated, death generally takes place suddenly; but when it is exuded, as just stated, the already depressed vital power is increased, and the oppressed action of the heart is more slowly abolished by the effusion.

277. iii. HÆMORRHAGE INTO THE PLEURAL CAVITIES has been observed by MORAGNI, PLENCIZ, CALDANI, STOLL, FRANK, JOHNSON, myself, and others. It most frequently arises from rupture of an aortal aneurism within the thorax. In this case, the blood is effused, in the first instance, into the posterior mediastinum, death seldom occurring until the accumulated blood lacerates this part, and opens the way to suddenly fatal effusion into one of the pleural cavities. The aneurism may be so large as to occasion symptoms which will lead to its recognition; or it may be so small, and attended by so little disorder, as to escape detection, as in the case of Sir DAVID BARRY, an eminent member of the profession. In him, the symptoms before, and the appearances after, death illustrated this procession of the morbid phenomena. Hæmorrhage into the pleural sac may proceed, also, from erosion or ulceration of the aorta (MORAGNI, PORTAL); from rupture of the pulmonary vein (EICKEN); from rupture of the vena cava (PORTAL); or from rupture, or a varicose state, of some of the veins near the pleural surface (CALDANI, PORTAL, &c.). Hæmorrhage into the thorax is frequently consequent upon fractures of the ribs and wounds; and many of the instances, where it seems to have arisen spontaneously, have been induced or hastened by external injury or muscular exertion. — More or less blood may be exuded from the surface of the pleura, in states of very intense inflammation attended by diminished vital resistance, or during the advanced stages of putro-adynamic fevers and of other malignant diseases. But these are comparatively rare occurrences; and the blood effused is seldom pure, but mixed with much serum or watery exhalation; or, rather, the effused serum is more or less deeply coloured by an admixture of red particles.

278. iv. HÆMORRHAGE INTO THE PERITONEAL CAVITY, like hæmorrhages into other serous cavities, seldom occurs, unless as a consequence of external injuries or wounds. It sometimes depends upon rupture of a large vessel, or the laceration of some viscus, especially the spleen, liver, or stomach; but it may proceed from other lesions. BALLONIUS, PORTAL, DANIEL, and others, have recorded instances of its occurrence from rupture of the spleen; a case of which has come under my own observation. ATRIAULT mentions an instance in which it arose from ulceration of some of the vessels of this viscus. BLANE found it to proceed from the surface of the liver. When the spleen or liver is engorged or enlarged, after repeated attacks of ague, particularly in warm or miasmatic countries, a comparatively slight external injury, or a concussion of the trunk, may occasion laceration or rupture of either, with extravasation of blood in the abdomen. Hæmorrhage in this situation may arise, also, from operations for strangulated hernia, especially when a portion of omentum has been removed; or from paracentesis in cases of ascites (BELLOCQ), or of encysted dropsy. Rupture of an aortal aneurism, or

of the aorta without any pre-existent aneurism (FERRO, J. P. FRANK, JAMES, ARNOTT, ROSE, HUME, &c.), of the vena cava (BONET, LANCIANI), of the vasa brevia (SANDIFORT), of the mesenteric artery (FERRO), and of the splenic artery (NENET), with hæmorrhage into this cavity, have been severally noticed. JENTY mentions a case in which rupture of the vena cava seemed to have been favoured by curvature of the spine. HEIM traced the hæmorrhage to the ovarian vessels; PALFYN, to the vessels of the omentum; GODELLE, to rupture of a Fallopian tube; and PORTAL, to the mesenteric vessels, in a female who had experienced sudden suppression of the catamenia in one instance, and to the ovarian vessels in another. In cases of tubal or ovarian fœtation, extravasation of blood into the abdominal cavity is a necessary consequence of the growth of the ovum; and it has been observed in such circumstances by BÜTTNER, HEIM, CLARKE, PAINTER, myself, and many others. — OSLANDER met with hæmorrhage into the peritoneal cavity after delivery, that had arisen, in his opinion, from dilatation of the Fallopian tubes. The exudation of blood, or of a bloody serum, from the peritoneal surface occurs only during those morbid states, in which it has been observed to take place into the pericardium or pleura. (See art. PERITONEUM.)

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279. XI. HÆMORRHAGE INTO THE AREOLAR TISSUE, OR INTO THE SUBSTANCE OF AN ORGAN, occurs in two forms: — 1st, Confined to a single part or organ; — 2d, Extended to several organs, and more or less diffused. The pathological states of which either of these forms may be the result are chiefly the following: — a. Increased determination of blood or vascular action; — b. Active congestion, or engorgement from increased flow of blood to the part; — c. Passive congestion from interruption to the return of blood from the seat of hæmorrhage; — d. Softening, or diminished vital cohesion, of the organ, in which extravasation takes place; — e. Dissection of the vessels of the part favouring rupture, &c.; — f. Laceration or rupture of an organ from concussions or external injuries; — g. Loss of vital tone, expressed chiefly in the extreme capillaries; — h. A morbid state of blood; — and, i. These last two conditions conjoined. The more limited forms of hæmorrhage into cellular or parenchymatous parts may arise from either, or from more than one, of these pathological states; but the more diffused or extended depends chiefly upon the last three of them. The former may occur primarily, or without any very manifest sign of pre-existent disorder, although such disorder actually exists; the latter is generally the result of very serious and evident disease, especially of scurvy, purpura, putro-adyneamic or malignant fevers, &c. — The organs, in the structure of which hæmorrhage most frequently occurs, are the brain and cerebellum, the spinal chord, and the lungs; and those in which it is more rarely observed are the spleen, liver, pancreas, and kidneys. It still more rarely takes place in two or more of these parts at once, unless in the

course of the dangerous constitutional maladies just mentioned. M. ROBERT (*Nouv. Biblioth. Méd.* t. ii. p. 74. 1826) records a case in which he found blood effused in the substance of the brain, lungs, liver, pancreas, and kidneys; but the pre-existent constitutional disorder was characterised by extreme adynamia, manifested especially in the vascular system and circulating fluids.

280. Hæmorrhage into the *areolar tissue*, particularly in those parts of it that possess the membranous form, giving rise to ecchymoses, petechiæ, &c., occur chiefly in *purpura*, *scurvy*, and the last stages of malignant exanthematous and other fevers; and in these diseases hæmorrhage generally takes place, also, from mucous surfaces, and sometimes, likewise, into the substance of one or more organs. In these cases, the blood is dark, dissolved, or deficient in crasis, and incapable of coagulating. The instances of "*Universal Hæmorrhage*" (*Hæm. Universalis*) recorded by several writers of the sixteenth and seventeenth centuries are entirely to be referred to the above maladies, or to a scorbutic, conjoined with a hæmorrhagic, diathesis, generated most probably by the nature of the food and modes of living, and to the putro-adynamic state which exanthematous and typhoid fevers then frequently assumed. (See arts. *APOPLEXY*, *BRAIN*, *LUNGS*, *PALSY*, *PURPURA*, *SCURVY*, &c.)

HÆMORRHOIDS.—*SYN.* *Αἱμορροΐς* (from *αἷμα*, blood, and *ρροΐς*, a flux), Hippocrates, Galen, Celsus. *Hæmorrhoids*, Pliny, Linneus, Sagar, Sauvages, Cullen. *Hæmorrhoides*, Juncker. *Fluxus Hæmorrhoidalis*, Hoffmann. *Proctorrhæa*, Auct. var. *Proctalgia Hæmorrhoidalis*, Macbride. *Marisca*, Good. *Hæmorrhischesis*, Ploucquet. *Hæmorrhæa Vasorum Hæmorrhoidalium*, Swediaur. *Hæmorrhoides*, *Flux Hæmorrhoidal*, Fr. *Goldaderfluss*, *Hämorrhoiden*, Germ. *Morice*, Ital. *Piles*.

CLASSIF. — 1. *Class*, *Fébrile Diseases*; 4. *Order*, *Hæmorrhages* (Cullen). 1. *Class*, *Diseases of Digestive Organs*; 1. *Order*, *Affecting the Alimentary Canal* (Good).

II. CLASS, II. ORDER (Author).

1. *Pain, tension, weight, heat, or sensation, referred to the rectum and its accompaniment or followed by tumours in these parts, or by a flow of blood from them when the patient is at stool; recurring after intervals, and sometimes periodically.*

2. *Preliminary Remarks.*—There are few diseases upon which so much has been written—ignorantly and dogmatically written—as upon hæmorrhoids. In modern times, the pathology and treatment of this disease have been too generally viewed in a limited point of view, and usurped by persons who have endeavoured to convince the public that they have made it the subject of especial investigation, or even of exclusive study.—Judging, however, from their writings, more mischief than benefit has thus arisen from the mechanical division of labour they have adopted; and not only have they failed in advancing our knowledge as to the nature and treatment of the malady, with which they profess so intimate an acquaintance, but they have actually overlooked, or been ignorant of, the part it occupies in the circle of morbid action, and they have frequently, even when affording

temporary benefit by empirical means, or by local or surgical aid, caused most serious consequent mischief. Those affected by this complaint are unable to foresee the consequences that may result from injudicious interference, especially if appropriate medical treatment be not afterwards pursued; and, whilst immediate relief, when procured, is made a matter of high commendation, both by those who receive, and by those who administer it, the remote or contingent bad effects are rarely traced by them to their origin, and are often of such a nature as to terminate all inquiry.

3. Of those who have professed an infallible cure for hæmorrhoids, there have been few who appear, from their writings, to have been acquainted with the nature of the complaint; with the relation in which it often stands to other morbid conditions; with its frequent existence as the more manifest part of a more important and concealed state of disease, and with the most safe and appropriate means of removing it. They have viewed it as a local disorder which is to be cured by local or surgical treatment, and not as a visceral disease often depending upon latent or extensive morbid conditions, to which surgical measures may prove injurious; and for which such measures are at most only occasionally required, and then as adjuncts merely of a strictly medical, and often constitutional, treatment. Owing to an imperfect knowledge of the varieties of hæmorrhoidal tumours, and of their pathological relations—*a.* Fatal hæmorrhage has not infrequently resulted from excising or puncturing them;—*b.* Enteritis, peritonitis, and even internal phlebitis have followed the extirpation of them by ligature;—and, *c.* Fatal diseases of the brain, or of the lungs, or even of the liver, have arisen from the permanent stoppage of a discharge by these means, to which the system had become habituated, and which had warded off these and other serious maladies. This evacuation being arrested by these or other local measures, the safety valve to an overloaded state of the vascular system is permanently closed; and a source of local derivation and of discharge, that had preserved a vital organ from impending disorganisation, is cut off, without either preparing the system for the changes thereby produced, or substituting some other evacuation in its place. Persons who thus extend the division of labour principle to a science which admits not of it with advantage either to the branch which is thus attempted to be cultivated, or to those upon whom it is practised, may reply, that they have seen no mischief result from the means they employ; but the mischief in such cases is strictly of a medical nature, is often remote, and falls not within the sphere of those who thus unscientifically and empirically limit the practice of their profession. Division of labour may improve manual dexterity, or may extend mechanical contrivance; but it cannot improve pathological knowledge, nor illustrate the relations or associations of morbid actions, nor lead to truly scientific, and safe, and appropriate, and permanently beneficial, modes of cure.

4. **I. PATHOLOGICAL HISTORY OF THE DISEASE.**—The term *hæmorrhoids*, signifying, literally, a flow of blood, was made use of by HIPPOCRATES; and, down even to the present time, has been applied to a dilatation of the veins at

the extremity of the rectum, accompanied with a flow of blood; and the vessels of this part have been consequently called the hæmorrhoidal vessels. Many of the ancient and of the older writers have extended the term, not only to every complication of this complaint, but also to hæmorrhages from natural outlets; and thus hæmorrhoids of the uterus, of the bladder, and of the mouth, have been frequently used to denote hæmorrhage from these parts. Since the time of MORGAGNI the term has been applied indifferently to that morbid condition which was generally attributed to dilatation of the hæmorrhoidal veins, and to hæmorrhage from the rectum, although some authors have endeavoured to restrict it to one or other of them. But as the tumours and the flow of blood, whether appearing separately or in conjunction, arise from the same source; I shall consider them as varieties of the same disease. It will, however, be shown that the hæmorrhoidal tumours consist of different kinds or modifications of structural lesion, and that either of them may take place independently of, as well as in connection with, a discharge of blood from the anus.

5. i. *General Character and Symptoms of Hæmorrhoids.*—The first attack is usually slight, and often attended by little constitutional disorder. Slight pain, heat, weight or fulness, are felt at the extremity of the rectum, or about the sacrum, sometimes extending to the perineum, with obscure tenesmus or pain at stool, often with costiveness, and occasionally with an irregular or irritated state of bowels. The sensibility of the bladder or urethra is frequently also increased. After a short time, or in two or three days, at most, a slight flow of blood, generally of a bright colour is observed with the fæces, or smearing their surface. In some persons this flow does not take place, particularly in early attacks; but when it does, it is usually critical, and all the symptoms subside. When this discharge does not occur, as well as very frequently when it does, one or more tumours, of varied size, begin to appear within or at the verge of the anus. These tumours are preceded by a stinging or pricking pain, which increases as they enlarge; or are compressed by the sphincter ani. Sometimes blood oozes from their surface, or is squirted out through small apertures when at stool. Occasionally they remain dry, or are moistened by a colourless serum; but, in either case they collapse, after a short time, and entirely or partially disappear.

6. After a longer or shorter interval the same train of symptoms returns, generally in a greater degree, and acquires increased severity by the repetition. The pains are more acute, especially when sitting, standing, or walking; and often extend down the insides of the hips and thighs; the blood is discharged in greater quantity; and the tumours, if they have previously been developed, become larger or more numerous. Subsequently, when they collapse, and particularly when they have been often distended, they present so many flaps of skin, and when external form a serrated margin to the anus.

7. In irritable or weak persons, especially when the complaint is simple or primary, is severe, or returns often, the local alteration affects more or less the general health. Frequent chills, or coldness, alternating with flushes, dryness of

the mouth, hardness or frequency of pulse, costiveness, pallor of the countenance, and other febrile symptoms, are complained of. The functions of digestion are also more or less deranged, and the bowels are either costive, or irregular, especially when the complaint is dependent upon disorder of the hepatic organs. When it is associated with disease of the lungs, the symptoms referable to the chest are generally materially alleviated by it, especially if it be attended by sanguineous discharge; and a similar result follows its occurrence in plethoric persons liable to headaches, or to congestion of the brain or liver. In all cases, however, care should be taken not to mistake the constitutional disorder, or the affection of remote organs, often occasioning the disease, for sympathetic disturbance preceding the hæmorrhoidal attack. A minute examination of the relation of the complaint with other ailments should always be instituted, before the indications of cure are determined upon.

8. Such is the usual course of hæmorrhoidal attacks; but the sense of weight, heat, fulness, or constriction, with more or less pain about the anus, and slight constitutional disturbance occasionally occur without either effusion of blood or the formation of tumours, even in old cases; and the hæmorrhage sometimes takes place without the tumours, but seldom without being ushered in by the other symptoms. Indeed, in all cases, indications of congestion, or of increased action of the vessels of the part are present in some degree, these states of the vessels constituting a principal feature of the complaint. Both the local and constitutional symptoms, and the structural lesions, show, that increased determination of blood to the extreme vessels of the part, in most cases, and impeded return of it from them, in others, are the chief pathological conditions of the disease.

9. ii. *Of the Hæmorrhoidal Tumours.*—The nature of these tumours was not understood until lately. They were usually distinguished into *internal*, and *external*, and into *bleeding*, and *blind*, piles, according to their situation in respect of the verge of the anus, and to their connection with a sanguineous discharge. The opinion of the older writers and many of the moderns, and amongst the latter the BELLS, HOME, BAILEY, COOPER, &c., imputed them to dilatation of the veins. More correct views as to their structure were entertained first by LE DRAN and RICHTER, perhaps also by CULLEN and ABERNETHY; and more certainly by CHAUSSIER, DE LARROQUE, DE MONTGOREY CALVERT, and COLLIER. From my own observations, as well as from the researches of these and other pathologists, hereafter referred to, there are *three kinds* of hæmorrhoidal tumours, differing essentially both in their structure and appearance. — *a.* The *first*, or most common kind is first seen in the form of fleshy tubercles, of a brownish or pale red colour, situate within the anus, or descending from the rectum. They have a somewhat solid or spongy feel; and, when divided, they present a compact or porous, and bloody surface. As the blood oozes from the cut surfaces, they become pale and flaccid. When the tumours are *external*, they are paler and more elastic; are infiltrated by serum; and are sooner produced, and disappear more readily, than when they are *internal*. — In

either case, they often contain a central cavity filled with fluid or coagulated blood, of a dark colour. This cavity is either smooth or granulated, and minute vessels may be traced into it; Mr. CALVERT states that it has no direct connection with any larger vessels. It is usually small; generally about the size of a pea, but sometimes that of a bean, or walnut, or even larger. More frequently, however, there is no regular cavity or cyst; the substance of the tumour being as if infiltrated with blood, which becomes coagulated and dark: but this appearance is not owing to extravasation, but rather to dilatation of a number of small vessels which traverse the tissue in the direction of the axis of the rectum, as, upon dividing the part longitudinally, numerous dark streaks are seen in its substance, whilst a section made transversely shows only small roundish specks.

10. The patient is usually made sensible of the development of these tumours, by a peculiar pricking or stinging sensation, within or at the margin of the anus; and one or more are found slightly elevated, or pressed downwards by the sphincter. The increase of these tumours takes place more by elongation than by expansion, and they assume a conical form, and are larger than their necks. Sometimes blood is exhaled from their surface; in other cases, or on other occasions, a serous fluid is exuded; and occasionally they are entirely dry, especially when they are external. In either case they generally disappear in two, three, or four days; but return again at an uncertain or at a regular period, and increase in size, becoming firmer in texture. After some blood is evacuated from them, or after the determination of blood to the parts has ceased, they collapse, leaving small pendulous flaps of skin, which ultimately disappear if the tumours have been small; but if they have been large, these flaps continue conspicuous, and give a projecting and irregular margin to the anus. Having been strangulated by the sphincter, or repeatedly engorged with blood or lymph, or chronically inflamed, these tumours become more solid and almost permanent, are a source of constant discomfort, and give rise to several of the consequences and complications about to be noticed

permanent state of the tumours is partly to the development of capillary and partly to the effused blood and lymph becoming organised; this latter circumstance especially giving rise to the excrescences, or irregular mass of tumours found around the anus in those subject to hæmorrhoids. — Occasionally the tumours acquire a very great size, arising from the effusion of much blood in the central cavity, and of blood and lymph in the cuticular envelopes. Instances of the enormous size of these tumours have been recorded by SCHMUCKER, CALVERT, and other writers about to be referred to.

12. *b.* Hæmorrhoidal tumours formed by a varicose state of the veins of the rectum are not so common as those just described. They seldom attract attention until they have made some progress, for the distension takes place very gradually, without causing much sympathetic disturbance, or materially increasing previous disorder. They are not so disposed to enlarge at particular pe-

riods, and are more permanent and less painful than the form already noticed. They are commonly of a dark or bluish colour, and soft and elastic to the touch. When compressed by the finger they become sensibly less, but return to their former state when the pressure is removed. They are round and broad at the base, and often distributed in irregular or ill-defined clusters. They evince little disposition to bleed, unless when ruptured or injured. They appear crowded together, extend up the rectum, are more or less internal, or become external chiefly during costiveness, or when the patient is straining at stool, or after a fecal evacuation; whilst the former kind is limited, and generally external, or within the reach of the finger. VALSALVA, LUDWIG, PETIT, RICHERAND, BEGIN, CALVERT, and others, have seen hæmorrhoidal varices extend upwards along the rectum to the colon, especially in persons who had experienced obstruction of the portal circulation. M. BEGIN observes that, in most cases, the dilated superficial, submucous, or subcutaneous veins are only the smaller part of those surrounding the rectum. Sometimes the lower part of this intestine appears as if plunged in the middle of a network of dilated and engorged veins, forming a thick vascular ring, the incision or puncture of which may give rise to dangerous hæmorrhages. M. RICHERAND found, upon dissection, those varicose tumours filled with clotted blood, and their interiors continuous with those portions of the veins which retained their usual size. These dilated vessels presented alternately a state of distension and their natural calibre; and were continued in every direction, forming a plexus around the outlet of the bowel, the dilated portions being covered only by the thinned mucous membrane.

13. As the varicose tumours arise from many of the causes that produce the preceding form (§ 9.), and as both varieties occupy nearly the same situation, it may be reasonably inferred that they may exist together, or that the latter may often give rise to the former in connection with it. Now this is sometimes the case; inflammatory irritation, supervening in the course of the varicose form of the disease, superinducing the *varicose*, or the first variety of tumour, and thereby obscuring the varicose character of the former. Or a different procedure, as Mr. CALVERT supposes, may take place; the veins becoming dilated in consequence of the previous formation of the cellular tumours. These complications of the tumours can be ascertained only by a careful examination, and by attention to the history, progress, and symptomatic relations of the case.

14. *c.* A third form of hæmorrhoidal tumours, of an *erectile* character, was first noticed by Sir JAMES EARLE, and more particularly described by Mr. COLLE. These tumours are of different sizes; are soft and spongy to the touch, of a purplish colour, with a number of minute, but distinct, vessels on the surface of each. One, two, or more of these tumours protrude through the anus when the patient is at stool. Early in the disease the protruded parts retire spontaneously; but, in advanced stages, they require to be replaced by the hand. Alvine evacuation is followed by pain, which, especially when the disease is prolonged, does not cease for two or three hours; and is attended by losses of blood,

which sometimes occasion exsanguine exhaustion; the sphincter ani becoming wide and relaxed, and the tumours protruding. Dr. COLLES states that, on examination after death, he found bloodvessels as large as crow-quills, running for some way down the intestine, and then dividing into a number of branches; each of these vessels ramifying profusely, and each forming, by the interlacing of its numerous branches, one of these erectile or vascular tumours. The trunks and branches of these vessels were covered only by the lining membrane of the intestine.

16. iii. *Of the Hæmorrhoidal Discharges.* — A. The ancients believed the blood to be discharged from the tumid extremities of the hæmorrhoidal veins. MORGAONI found these veins more or less dilated in several cases, and it was very generally considered that the blood oozed through, or proceeded from rupture of, these vessels. The investigations of modern pathologists have satisfactorily shown that the hæmorrhage may arise from various sources: — 1st, From congestion of the vessels of the part followed by exhalation or exudation from the internal surface of the rectum; — 2d, From irritation of this bowel, followed by vascular determination and sanguineous exhalation; — 3d, From the surface of the hæmorrhoidal tumours, especially those belonging to the first and third varieties; — and, 4th, From the rupture of varicose or enlarged vessels. When the blood proceeds from the first or second of these sources, it may be seen to exude from the surface of the protruded portion of bowel; and the discharge generally removes all the symptoms characteristic of the complaint. It is also frequently preceded, and followed, by an exhalation of a serous nature, from the same source. Hæmorrhage, in connection with the common form of tumour, may arise from exhalation from its surface; or from the contraction of the sphincter forcing blood, in a fine stream, from one or more points of it; or from exhalation from the adjoining mucous surface, in consequence of congestion of, or of sanguineous determination to, the affected bowel. Where the vascular or erectile tumours exist, blood is always discharged, and uniformly from their surface. The varicose form of tumour is less frequently attended by hæmorrhage than any of the others. When the blood proceeds from the rupture of enlarged or varicose vessels, it generally flows in a stream whilst the patient is straining at stool, the flow increasing or returning when this effort is repeated. The passage, also, of hardened fæces over the congested or inflamed mucous surface of the rectum, or over the tumours developed beneath this surface, or over the enlarged or distended vessels, may lacerate or injure them in such a manner as to be followed by hæmorrhage, but in such cases the discharge is usually slight.

16. In many cases, the blood flows for a short time only, and is not again seen until the next attack. But in others, it is observed repeatedly when the bowels are acted upon, or the discharge is renewed when the fæces are expelled, for several days. It is generally of a red colour, and either covers, or follows, the fæcal evacuation; but when it is consequent upon venous congestion or dilatation, it is of a dark hue, and follows, or is partially mixed with, the fæces.

17. B. The returns and amount of the hæmorrhoidal discharge are extremely various; but in many instances a periodical return is observed in both males and females. In females, the hæmorrhoidal, not infrequently takes the place of the catamenial discharge, especially at the age when the latter usually ceases, and assumes a periodic form. In some instances, these evacuations alternate. When the morbid action has once commenced in this part of the body, it being favoured by peculiarity of structure and by several pathological relations (§ 30.), there is always a predisposition thereby formed to the recurrence of it; and the same causes still operating, it at length becomes habitual, and even necessary to the prevention of more serious maladies. It has been satisfactorily shown by observation that, as long as the causes of hæmorrhoids continue, the evacuation attending them is a wholesome occurrence, inasmuch, as an overloaded state of the vascular system, that would otherwise induce dangerous visceral disease, is thereby removed. In all cases, therefore, when hæmorrhoidal affections depend upon constitutional causes, or are connected with any indications of visceral disease, or have existed for a considerable time, their return should not be prevented, unless other sources of discharge, or other sanguineous evacuations are substituted for them: but, when they proceed from causes which are chiefly or entirely local, neither the vascular system nor constitution, nor any important internal organ manifesting disorder, a more active interference may be attempted; although even then with caution, especially if there be any tendency to vascular plethora, and if the principal causes of the disease are still in operation.

18. The quantity of blood lost in each attack may be very trifling — may not exceed a drachm or two; or it may amount, at one time, to several pounds. Instances are adduced by RUOBIUS, FERNELIUS, LANZONI, HARRIS, SPINDLER, MOHRING, HOFFMANN, EARLE, CALVERT, and others, in which the quantity discharged seemed enormous. Mr. CALVERT supposes that the vessels in such cases are in a state of extreme excitement: but this is by no means a correct inference. In cases of excessive discharge, the blood is either passive or venous, or is consequent upon, or upon interrupted circulation in hæmorrhoidal vessels. The evacuation is commonly excessive from its frequent repetition; and from its quantity at any one time; and not infrequently induces a state of exsanguine exhaustion, requiring the most decided interference.

19. C. *A colourless Hæmorrhoidal Discharge.* — *Mucous or serous Hemorrhoids (H. mucosæ vel serosæ)* of Authors; *Hémorrhoides blanches*, BOZAI; *Medorrhæa Ani*, J. P. Frank — sometimes takes place, and either follows the discharge of blood, or attends the hæmorrhoidal tumours, especially those belonging to the first variety. It varies much as to quantity and appearance. It is either watery or mucous; or resembles a weak solution of gum; or it is albuminous and like the white of egg. When watery, serous, or mucous, it usually exudes slightly from the anus; when more abundant or albuminous, it is commonly passed at stool. In cases attended by much heat and irritation about the anus, a colourless exudation, consisting chiefly of an increased secretion from the follicular

glands of the part takes place. These varieties of colourless discharge are most frequent when there is little or no hæmorrhage, and when the disease is associated with *ascarides*, or with *leucorrhæa*, or with pregnancy.

20. iv. *Of the Consequences and Complications of Hæmorrhoids, local and constitutional.* — A. *Inflammation* is one of the most frequent morbid associations of hæmorrhoids. It is attended by more or less swelling and redness of the lower part of the rectum and anus; by throbbing and by increased sensibility and heat, aggravated by the passage of feces. The sanguineous discharge is slight or absent; but if it become abundant, the symptoms subside. A mucous discharge is, however, not uncommon. Sometimes the inflammation is severe, and implicates not merely the mucous membrane and subjacent cellular tissue, but also in a slighter degree the prostate gland and neck of the bladder, occasioning much pain in the perineum, sacrum, &c., with dysuria, or even strangury. The irritation may even extend to the womb in females. The tumified state of the lower part of the intestine in these cases, together with the inflamed tumours, and the spasmodic constriction of the sphincter, produces obstinate constipation and straining or tenesmus. Not infrequently the protrusion of the tumours, when internal, with a portion of the mucous membrane, follows the action of the bowels, and the inflamed tumours, being strangulated by the sphincter, become remarkably painful, or even ultimately slough. With the severity of the local symptoms, the constitution generally sympathises; and febrile symptoms are developed, particularly in irritable or nervous temperaments.

21. B. *Fissures or rhagades of the anus* are not uncommon in cases of hæmorrhoidal tumours. They may commence in small longitudinal ulcerations; but they more frequently seem to take place as follows:—When the tumours are large and numerous, hardened fecal matters, in passing, forcibly between them, crack or slightly tear them at their bases, the chronic inflammation in this situation hardening and rendering the tissues less yielding to any distending power. These fissures are most apt to occur when the tumours are red upon the sphincter. They are slight at first, but they enlarge, and to the frequent operation of the causes that feed them and to the lodgment of fecal matters, and occasion great pain, which continues some hours after each stool, and spasmodic constriction of the sphincter. Herpetic or other chronic eruptions sometimes also appear about the anus, and favour the supervention of these fissures, by rendering the surface harder and less capable of distension, or by diminishing its vital cohesion. Fissures of the anus mostly occur as a consequence of the first and third variety of hæmorrhoidal tumour.

22. C. *Ulceration or abscess, frequently passing into fistula*, often follows hæmorrhoids, particularly when inflammation occurs. When the inflammation is superficial, affecting chiefly the mucous membrane, it gives rise to ulceration in one or more points, especially in the situation of the tumours; and it may penetrate deeply, or be followed by small abscesses, either in these tumours or in their vicinity. When the inflammation is more deeply seated, implicating the cellular and

adipose tissues, an abscess then forms very readily and often rapidly. Pain, tension, and heat about the anus are then severe, and with the throbbings, extend up the pelvis. When the abscess is anterior to the anus, and presses upon the urethra, and parts adjoining the neck of the bladder, the suffering is very great, and sometimes is attended by strangury or total retention of urine. The abscess, in the female occasionally extends to one of the labia, or even breaks into the vagina, or passes into fistula in that, or in an adjoining situation. Of this I have seen several instances.—(See art. RECTUM.)

23. D. *Hæmorrhoidal tenesmus, or spasmodic constriction of the sphincter, frequently with protrusion of the mucous coat of the rectum*, is a common complication of hæmorrhoidal affections, particularly when the tumours are inflamed, or when there are fissures between them (§ 21.). If the tumours are seated within, or above the sphincter, or if the mucous or submucous tissues are much tumified or infiltrated by inflammatory determination, the actions of the parts of the bowel above this, or the efforts at expelling fecal matters, are attended by much tenesmus and often cause a protrusion of the tumours and tumified parts, sometimes to the extent of partial invagination of the rectum. When the sphincter is spasmodically constricted, in consequence either of the irritation of the internal surface of the intestine, or of fissures in the anus, the veins are grasped so firmly by it as to give rise to a congested or varicose state of those external to, or below, the constriction, and the disease is thereby aggravated and prolonged. This irritable or spasmodic state of the sphincter may exist in nervous persons, without fissure or inflammation, and be attended by great pain, as shown by M. DUPUYTREN; but it most commonly is associated with one or both of these morbid states, as well as with a bloody or colourless discharge, and with hæmorrhoidal tumours, or with either of them only.

24. E. *The pain of hæmorrhoids* varies in character in different cases. In some it is constant; aggravated upon passing a motion, and is attended by heat and throbbing: it is then owing chiefly to inflammation. In others it is intermittent, extremely severe at times; comes on and ceases suddenly; is eased by pressure; and is of a nervous character. This kind of pain is often connected with spasmodic constriction of the sphincter, and was denominated *proctalgia* by SAUVAGES. The pain is often also connected with fissure, as shown by BOYER, MENAT, MONTEZAN, and others; and is then pungent, lancinating, cutting, lacerating or peculiar, and greatly aggravated by the action of the bowels. In many cases, the pain extends to the insides of the hips and the back of the thighs, or to the urinary organs and urethra; and occasionally up the pelvis into the abdomen. Indeed *colicky pains*, often of a severe kind, usher in an hæmorrhoidal attack, as well as supervene in its course, or upon certain modes of curing it, as upon the application of ligatures on the tumours.

25. F. *Irritation or inflammation of the neck of the bladder and prostate*; painful affections of these parts of the urethra, and of the vesiculæ seminales; difficult or painful micturition; retention of urine; and prolapse of a portion of the rectum; are not infrequent complications of

hæmorrhoids. As more remote consequences of the disease, may be mentioned, fistula in ano, recto-vaginal fistula, induration and thickening of the surrounding cellular tissue, permanent stricture of the rectum, and chronic or constant prolapsus ani. These, and some other organic lesions consequent upon hæmorrhoidal attacks, are fully described in the article RECTUM.*

26. 11. DIAGNOSIS. — a. Hæmorrhoids may be confounded with *Intestinal Hæmorrhage* (§ 185.); but in that disease the local symptoms and lesions characteristic of hæmorrhoids are not present in a prominent or primary manner; nor can a varicose state of the vessels, nor any other form of tumour, be detected upon examining the rectum with the finger. Besides, intestinal hæmorrhage is more generally a symptom of an acute or dangerous visceral disease, and more frequently appears in the advanced stages of ædymic or other fevers, or as a symptom of non-febrile cachexia, than the hæmorrhoidal discharge, whilst this latter is more commonly the principal and most manifest, if not the primary, affection. It may, however, sometimes happen that a patient subject to hæmorrhoidal affections is seized with low fever; or with remittent or simple fever, complicated with congestion or obstruction of the liver, with or without jaundice; and hæmorrhage from the bowels supervenes. The question is, whether, in either of these cases, the blood is discharged from the testinal mucous surface (see arts. FEVERS (§ 474.), and HÆMORRHAGE (§ 185. 196.), or from the hæmorrhoidal vessels or tumours (§ 15.). These are not uncommon cases; I have seen several. A fatal instance of this kind occurred in my practice whilst writing this article. The diagnosis is of importance, as the prognosis and treatment are both affected by it. If pain, tumours, or other symptoms referrible to the rectum or anus, are present; if they be increased by the action of the bowels, and the blood discharged at that time appear fluid and recently extravasated; and if an examination of these parts, as far as it can be accomplished, show the presence or increase of hæmorrhoidal disease; then the hæmorrhage

proceeds from it: but if the blood be clotted, very dark, mixed with the secretions or feces, or consist of small coagula, the calls to stool not being attended by any distress, the source of the discharge is above that which is the seat of hæmorrhoids, and the examination post mortem will show the accuracy of the inference.

27. b. Hæmorrhoidal tumours may be confounded with *fungous* or *polypous* tumours or excrescences of the rectum or anus; but these latter enlarge progressively; their surfaces are indolent; and they rarely give rise to hæmorrhage, or to paroxysmal attacks resembling hæmorrhoids, or to inflammation of the adjoining parts. *Venerueal excrescences* about the anus may be ascertained by the history of the case, by their development exteriorly to the rectum only, and by the morbid appearance of their surface. The slightest observation, and the least experience, are sufficient for the diagnosis in these cases.

28. 111. CAUSES. — a. The antecedent or predisposing causes of hæmorrhoids are temperament, and constitution, age, sex, climate, and modes of living. Persons of a melancholic, bilious, or sanguineo-bilious temperament, of a plethoric habit of body, and with a venous system prominently developed, are most liable to this disease. The remark of STAMM, that "subjectis acridere solet facilius hic fluxus sanguineo-cholesteris, et sanguineo-melancholicis plethorâ affectus," is very near the truth. Owing to this predisposition, the complaint is often hereditary, as fully shown by HOLLER, ALBERT, LAMPROQUE, MONTGOMERY, and others. It is most common in mature age, when the abdominal viscera are in a state of greatest activity, and the vascular system most plethoric, and, consequently, when these viscera are most liable to disorder and to vascular determination. When it occurs in early puberty, or soon afterwards, it is chiefly owing to the determination of blood to the vicinity of the rectum, often favoured or induced by excessive venereal indulgences. Hæmorrhoids seldom appear before puberty; and yet I have seen several instances of it in children. I very recently prescribed for the disease in a boy of five years. TRNKA, ALBERTI, and many of the authors referred to, adduce similar cases, most of which are of a hereditary disposition. Authors differ as to the greater prevalence in males or in females. It depends upon the circumstances in which the latter are placed; but it is more frequent in males about the period of the cessation of catamenia, and afterwards, and during pregnancy than at any other time; and these and other circumstances may render it almost, if not quite, as frequent in them as in males. M. MONTGOMERY supposes that it is more common in females in an accidental or occasional form, and in males in a regular or constant manner.

29. Climate has some influence in disposing to the complaint. Warm, moist, and miasmatic climates are much more favourable to it than those which are dry, cold, or temperate. The former develops the bilious, melancholic, and choleric constitutions, relax the venous system, and favour obstructions of the abdominal viscera — changes most conducive to hæmorrhoids. Much, however, will depend upon the modes of life; the manners, and the morals of the inhabitants. — Habits of life exert the greatest influence in causing

* M. MONTGOMERY has given the following classification of hæmorrhoidal complaints: —

1. Blind or dry Hæmorrhoids (Cæce).
2. Hæmorrh. with Discharge (Fluente) — { White Discharge (Albe), with Catarrh of the Intestines.
Sanguineous Discharge (Sanguinolenta) — { By Exhalation.
By Rupture.
3. Hæmorrh. with Tumours (Tumores) — { Varicose (Varicose) — { Dry.
Mariscous (Mariscous) — { Bleeding.
Dry.
Bleeding from dilated Pores.
4. Painful Hæm. (Dolentes) — { Inflammatory.
Nervous.
Fissured.
5. Hæmorrh. with Constriction of the Anus (cum Contrictione Ani) — { Indolent. — From Induration of the Tissues.
Painful — { Spasmodic.
Sclirroux.
6. Hæmorrh. with Ulceration (Ulcerate) — { Superficial.
Fistulous.
7. Hæmorrh. with Prolapsus (cum Proclapsu Ani) — { From allongation of the internal Membrane.
From Invagination of the Intestine.
8. Hæmorrh. with Irritation of the Bladder (cum Irritatione Vesicæ Urinariæ) — { With Dysuria.
Strangury.
Hæmaturia.

the disease. Sedentary occupations, and indolence with luxurious nourishment, must, as Dr. J. JOHNSON remarks, either find some outlet to the superabundant fluids, or bring on a train of diseases. Hæmorrhoids and gout are the common consequences of this state of things. Many people who have led an active life for many years, on leaving off business and indulging in repose, become, for the first time, affected with piles. The sitting posture, retained for many hours in succession or habitually, particularly on warm or soft cushions; full or rich food; heating or stimulating diet, and intoxicating beverages; inordinate excitement of the sexual organs; habitual constipation, and the use of warm or irritating lavements, and strait corsets, not only predispose to, but often also directly produce this complaint. It is owing to the association of several of those causes that piles are so common amongst persons occupied at the desk, and amongst tailors and shoemakers, as well as among the inhabitants of Turkey and of other eastern countries. It has been very often remarked, that hæmorrhoids are more prevalent in spring and summer than in winter; and this appears to be the case. A disordered state of the alimentary canal and of the liver, and the suppression of other discharges, have a great influence in favouring an attack.

30. *b.* The occasional exciting causes are:—1st, Whatever inordinately excites the rectum and lower part of the colon, particularly too large or too often-repeated doses of calomel, aloes, colocynth, black hellebore, cambrige, or scammony; occasionally, also, of rhubarb, the neutral sulphates, and of any other purgative injudiciously prescribed or exerting a drastic action; the passage of acrid bile; the irritation caused by worms; many of the substances said to be emmenagogue; all the preparations of mercury in large or frequent doses; the liquor arsenicalis when thus employed; and the inappropriate use of chalybeates;—2d, Whatever prevents the return of blood through the hæmorrhoidal veins, as constipation, the lodgment of hardened feces in the rectum or lower parts of the colon, and repeated efforts at evacuation;—3d, Any, or structural lesions of the rectum, and obstructed circulation through the portal system; the pressure of a pregnant, enlarged, displaced uterus, or of a diseased ovary;—4th, A disease of the prostate or sphincter ani;—5th, Whatever excites and determines an increased flow of blood to the sexual and urinary organs, as venereal excesses, spirituous liquors, the irritation of calculi, of cantharides, &c.;—6th, External irritation of adjoining parts; prolonged walks in hot weather; riding in coaches, or on horses or mules without a saddle,—"Nam solet a nudo surgere ficius equo" (MARTIAL, l. xiv. epig. 86.); and the frequent application of leeches to the anus;—and, 5th, The local influence of cold or warmth, as sitting on the ground, or on stone seats or on damp cushions, and the habit of standing with the back to the fire.—Besides the foregoing, various other circumstances occasionally cause this complaint, as the more violent mental emotions, both exciting and depressing; errors of diet and of regimen; inordinate excesses of any kind; and diseases of other organs, particularly those of the lungs or

liver. Hæmorrhoids are, moreover, sometimes critical in other maladies, especially in fevers and in inflammations of the brain, or of any of the viscera lodged in the thoracic and abdominal cavities. Owing generally to the association of several of the above causes, this complaint is very common in the upper classes of society, in both its simple and more complicated states; and hence the number of treatises which have appeared on it and its consequences.

31. IV. PROGNOSIS. — A favourable opinion of the result may generally be entertained in all the simple states of this affection, particularly when the patient is not far advanced in life, when the constitution is not in fault; and when the lungs, the liver, and brain present no tendency to disease. In other circumstances, and when the complaint is periodic, the removal of it, however cautiously effected, may be followed by serious effects, and especially by diseases of the lungs. (See § 3. 30.) In all cases, the prognosis should be founded upon a knowledge of the causes, of the form, and of the complication of the disorder. If the causes be not obviated, either the disease will return after a time, or it will be followed by a more serious malady. The extent and frequency of the discharge must always be taken into account as well as the form of hæmorrhoidal tumour. The more common variety of tumour is seldom attended by any risk, unless in the circumstances just alluded to, or when otherwise complicated, locally, or constitutionally. But the varicose tumours require a more cautious or reserved opinion; for, under the most judicious management, the more prominent or distended parts of the vessels may burst by a thinning process, and occasion profuse hæmorrhage. They are, also, generally connected with more or less visceral disease or constitutional disorder. The prognosis should not be materially different from that just stated, when the complaint is complicated with inflammation, for some one of its terminations, as abscess, ulcerations, or fissures between the tumours; fistula, spasm of the sphincter, prolapsus or invagination of a portion of the bowel, and even permanent stricture of the rectum, may take place, however judicious the treatment may be, and occasion very great or prolonged sufferings if not imminent danger. When the complaint is connected with visceral disease, and especially with pulmonary disease, the opinion should be formed chiefly with reference to this association; and the hæmorrhoidal affection should be so managed as to prove a derivation from the internal malady, and to prevent its increase.

32. V. TREATMENT. — A. The propriety of suppressing the hæmorrhoidal discharge ought always to be considered when entering upon the treatment of it. CULLEN erred egregiously in considering the complaint as generally local, and in recommending a local treatment; and in this he has been too closely followed by surgical writers. This practice, as Dr. J. JOHNSON observes, of removing the disease as speedily as possible, is very well in sound constitutions; but where there is any defect in the system, or organ predisposed to disease, we should be careful in avoiding the sudden stoppage of the hæmorrhoidal movement or discharge. HIPPOCRATES observed that this complaint often protected the system from other maladies; and a similar opinion

has been offered by STAHL, HOFFMANN, ALBERTI, ROSEN, RICHTER, and others. This is especially applicable to persons who are liable, hereditarily or otherwise, to gout, consumption, apoplexy, palsy, or other kinds of hæmorrhage. Mr. HOWSHIP states that a gentleman, subject to periodic hæmorrhoids, was induced by a quack, and in opposition to the regular opinion, to have recourse to a strong vitriolic wash. This cured the discharge; but the patient died soon afterwards of gout in the stomach. M. MONTGOMRE adduces proofs of a number of diseases having been produced by the suppression of piles; the most common of these being fevers*, hæmorrhages, inflammations of the lungs or pleura, phthisis, apoplexy, and various other internal and organic maladies. Mr. CALVERT saw gastric fever follow the application of cold water to the anus for hæmorrhoids. I was lately consulted in a case of apoplexy consequent on the stoppage of the discharge; and, some years since, in a case of fever, and in another of melancholy, from this cause.

33. *B. Constitutional Treatment.*—The oftener the hæmorrhoidal attack is renewed, the more liable will it be to recur, and the greater will be the risk of effecting a sudden cure. On this account it is most desirable to ascertain the causes of the complaint, and to remove them, as being most necessary not only to the efficacy but also to the safety of the treatment. Piles being among those diseases which it is sometimes dangerous to cure, care should be taken to distinguish those which ought, from those which ought not, to be removed. M. MONTGOMRE justly remarks, that those which are of a constitutional nature, or which the constitution, as it were, requires, are generally of long standing—sometimes from youth; or they replace some serious or habitual affection: they are hereditary, attended by well-marked indications of plethora—take place from various and opposite exciting causes, or without any obvious cause—are preceded by constitutional symptoms—are succeeded by an improved state of health, whether there be discharge or not—and, finally, are accompanied or followed by inconvenience when interrupted or suppressed: all these circumstances indicating a constitutional disorder which it is dangerous to meddle with too rashly. When hæmorrhoids are more strictly accidental, the symptoms and occasions of their appearance are different from the above, and they may be sub-

jected to more active treatment. But even these become, after frequent repetition or long continuance, habitual to the system—often a safety valve to the circulation, and require a constitutional and cautious treatment. In most circumstances, however, of the disease, strict attention to diet, and to the state of the excretions, with stomachic or deobstruent laxatives, when there is any tendency to constipation; and with cooling diaphoretics when there is any febrile movement present, will be productive of benefit. When the secretions and excretions from the bowels are deficient, a few grains of blue pill, or of hydrargyrum cum creta, with one of ipecacuanha, and five or six of extract of taraxacum or of soap, should be taken at bedtime, and a draught, with equal parts of the compound infusions of gentian and of senna, the next morning, or a teaspoonful of either of the electuaries in the *Appendix* (F. 82. 89. 98. 790.), at night. When constitutional irritation exists, the camphor mixture, and solution of the acetate of ammonia, may be given with sweet spirits of nitre, and the inspissated juice of the sambucus; or the infusion of the tilea Europea with the subcarbonate of soda or of potash, with the extract of taraxacum. The nitrate of potash may also be given with the electuary, or in a diaphoretic or diuretic mixture. When the complaint is connected with vascular plethora, the treatment should be based upon this circumstance; and a spare farinaceous diet, an open state of all the emunctories, and regular exercise, ought to be enforced. If these be neglected, the suppression of the discharge may be followed by some one of the maladies alluded to above. In other respects, the treatment should be directed according to the peculiarities and complications of the case, as shown in the sequel; and organs evincing a tendency to disorder ought to be protected, either by allowing the hæmorrhoidal complaint to proceed, or by increasing it (§ 47.) when it is insufficient for this purpose, or by establishing other sources of irritation or of evacuation.

34. *B. Treatment of the Hæmorrhoidal Discharges.*—*a.* While the sanguineous discharge is moderate, returns after considerable intervals, and leaves no unpleasant effects, no interposition of salutary adjustment of the constitution, attended with inconvenience; but with more than counterbalancing advantages. When, however, it becomes excessive, it ought immediately to be restrained. Its excess should be inferred rather from the effects than from the quantity; for some persons will lose large quantities of blood, almost daily for some time, and yet be otherwise in good health. But, whenever the discharge is followed by pallor, debility, syncope, or convulsions or spasms, it ought to be arrested. Like other hæmorrhages (see the art. § 35, 45. et seq.) it may be either active or passive; and the treatment should be directed accordingly.

35. *a.* In the active form, vascular determination should be diverted from the rectum, by quietude and the horizontal position; by bleeding from the arm when the pulse admits of it; and by cooling drinks and diaphoretics. If these do not succeed, cupping-glasses, with or without scarificators, according to the state of the system, may be applied over the hypochondria, as advised by the ancients, or upon the loins or sa-

* A gentleman, between fifty and sixty, who had suffered from hæmorrhoids and prolapsus of the mucous membrane of the rectum, had remained free from the complaint for a considerable time, in consequence of using cooling astringents, &c. locally, as advised by a person who had derived benefit from them. I was called to him, and found him labouring under a most dangerous form of fever, complicated with deep jaundice, and attended by a convulsion of approaching dissolution. His pulse was upwards of 120, soft, small, and weak. His bowels were relaxed, the stomach irritable, and the evacuations white. He had been attacked only the day before, and was restless and desponding. Calomel with camphor; effervescing draughts with the carbonate of soda in excess; Seltzer water with old wine; laxative enemata, and various other means, both internal and external, were prescribed according to the rapid progress of the malady. On the third night, he became delirious, soon afterwards, comatose; and, although the hæmorrhoidal discharge returned, from the use of the calomel, he died on the eighth day of the disease. Inspection of the body was not permitted.

crum. Derivatives, especially sinapisms, the terebinthinate epithem, or blisters, may be placed on these or other parts of the surface; and astringent or cold lotions, or injections, may be employed.—*β*. In the *passive form*, the acetate of lead with opium; the preparations of cinchona with the mineral acids, or the sulphate of quinine in the compound infusion of roses; the tincture of the muriate of iron, and other chalybeates; the balsams of Peru or of Copaiba, in large or repeated doses, or the terebinthimates, and the oil of turpentine, administered either by the mouth or in enemata, are the most efficacious means of arresting the discharge. (See art. HÆMORRHOGE, § 45, *et seq.*)—*γ*. *Plugging the rectum*, and the *actual cautery*, have been recommended in extreme circumstances. If the source of hæmorrhage is above the sphincter, a fatal internal discharge may follow from having recourse to the former of these. It is not practicable to resort to the latter, unless the spot whence the blood issues can be brought into view.

36. *b. The colourless mucous discharge (§ 19.)* from the anus, although a frequent attendant upon piles, is not necessarily so, as it may be occasioned by ascarides, &c. If it accompany internal or external tumours, and be independent of inflammation, slightly astringent and detergent injections; the internal use of the balsams, or of the spirits of turpentine, or of the balsams or terebinthimates combined with magnesia; and an occasional recourse to the stomachic aperient mentioned above (§ 33.), will generally remove it. When it is connected with inflammatory irritation, the means about to be stated (§ 42.) is most appropriate.

37. *D. Treatment of the Hæmorrhoidal Tumours.*—In all cases, the parts should be carefully examined by the practitioner, since the accounts given by patients themselves are very fallacious. Besides, the particular kind of tumour must be ascertained before the means of cure can be appropriately directed. Whether the piles be internal or external, or both, the anus should be washed with cold water after each evacuation; or with yellow soap and water, as suggested in the course of some excellent and able treatment of the disease, by Mr. Keys. If the piles be internal, this should be done before they are returned. If they cannot be returned, or are permanently protruded, or together external, whatever may be their form, pressure is one of the best remedies that can be applied to them. After each evacuation, and having thoroughly cleansed the parts, a conical pad, or piece of ivory, made to slide along a bandage or handkerchief, should be passed between the nates, and fastened above to a cincture or belt worn around the loins, in the form of the T bandage. The pad may be provided with a concentric wire spring, the more internal coils of which rise in a conical form. This is the best external mode of employing pressure.—When the tumours are internal, and protrude at stool, dragging the mucous coat with them, or when they consist chiefly of varicose veins, a short metallic bougie, of an oval form, with a short slender neck, and a conical base to press upon the anus externally, may be attached to the bandage, carefully introduced into the rectum, and worn occasionally. Pressure will thus be

made both above and within the sphincter, as well as without it. When introduced, the part of the *bougie* which rises above the sphincter being oval, varying in diameter with the peculiarities of the case, and being many times as thick as its slender neck grasped by this muscle, necessarily, from its shape, retains itself within the rectum, draws up with it the external tumours and prolapsed portion of the bowel, and presses its conical base externally against the anus, and upon the tumours or enlarged veins external to the sphincter. This combination of the *internal* with the *external method* of making pressure on the anus was introduced by Mr. MACKENZIE into practice, and is often extremely efficacious in the treatment of hæmorrhoids, and of the prolapsus attending them.

38. Before having recourse to either of these, it will often be of service to wash out the rectum immediately after each evacuation, by injecting some cold or tepid water, with or without a few grains of sulphate of zinc dissolved in it; and, if the parts be painful or irritable, a little cold cream, or of a slightly anodyne or astringent ointment, or of any other most appropriate to the circumstances of the case, should be applied to the surface of the bougie, when about to introduce it. At the same time, the bowels ought to be kept gently open by any mild or cooling purgative that will not irritate the rectum. I have found equal parts of the compound infusions of gentian and of senna, with the soluble tartar, &c. taken at bed-time, the most beneficial, when the digestive organs were weak; and one or two teaspoonfuls of either of the following electuaries, or of one of those in the *Appendix* (F. 82. 98.), the most serviceable when plethora or hepatic disorder was present, or even when there was a manifest tendency to them.

No. 242. R. Potassæ Supertart. in Pulv. ʒi.; Sulphuris præcipitat. ʒij.—iv.; Confect. Sennæ ʒij.; Syrup. Aurantii vel Zingib. q. s. ut fiat Electuarium molle.

No. 243. R. Potassæ Nitratis ʒij.; Confect. Sennæ, et Syrup. Zingiberis, aa ʒjss.; Succ. Spiss. Sambuci ʒj. M. Fiat Electuarium.

39. These electuaries may be variously modified, according to circumstances; and the confectio piperis nigri may be substituted for the syrup, or the inspissated juice of the sambucus, or a small quantity of it may be taken twice or thrice daily, when there is much relaxation of parts, or in cold, languid, or leucophlegmatic habits. Aperient medicines, in hæmorrhoidal cases, should always be taken at bed-time, in such doses as to operate only once, or at most twice, in the morning. Subsequent irritation of the bowels during the day will thus be prevented, especially if the rectum be washed out by a lavement after passing a motion. When it is necessary to have recourse to the short bougie described above (§ 37.), it should then be introduced; its passage being facilitated by an anodyne or slightly astringent ointment or pomade.

40. When the tumours are internal and protrude only at stool, and when they continue, notwithstanding the use of the constitutional treatment advised above, aided by the modes of employing pressure, just described, the removal of them by an operation may be entertained; but it certainly ought not to be practised, unless it be clearly ascertained that they belong to the *first variety* (§ 9.), and never, if they present the

varicose character (§ 12.). Most surgical writers make no distinction between these tumours, and resort either to the *ligature*, or to *excision*, to remove them. Mr. COPELAND refers to several instances of dangerous and even fatal results from having recourse to the ligature; and yet Dr. J. JOHNSON, in an able review of the subject, states that he knows "that Mr. COPELAND's practice is, and long has been, almost invariably to employ the ligature;" his success by means of it entirely depending upon his drawing the thread as tight as possible, so as completely to destroy the vitality of the tumour. This is certainly the only mode in which the ligature ought to be employed, and the one in which it has been generally recommended and practised since the days of GALEN: but Mr. COPELAND only states the danger of this method, in his work; and neither advises it, nor points out the mode of performing it! LE DRAN considers that, in addition to the pain, the ligature may cause inflammation extending along the rectum to the intestines; and M. MONTÈGRE objects to it for the following reasons — 1st, The operation is often difficult, and always very painful; — 2d, The tumours sometimes resist the ligature and, instead of falling off, ulcerate; — 3d, As they can only be tied in succession, the irritation produced by the first operation increases the swelling and inflammation of those remaining; — 4th, The ligature may produce all the effects of strangulation of the gut. Dr. J. JOHNSON thinks that these objections are founded on the inefficient mode of applying the ligature, and that few or none of them are valid, provided the thread is drawn to a proper degree of tightness at the beginning. I believe that even this more efficient mode is not secure from danger; that, in addition to the evils enumerated by MONTÈGRE, (a) inflammation of the hæmorrhoidal veins, extending even to the liver, (b) locked jaw, (c) retention of urine; and (d) contraction of the rectum, have in some instances resulted. It were to be wished that those who have been most in the habit of resorting to it, would state more fully than they have done, the results and the circumstances in which they confide chiefly in it. In the varicose form of the complaint, it is a most dangerous mode of treatment.

41. c. *Excision* of the tumours is preferred by LE DRAN, ABERNETHY, MONTÈGRE, COLLES, and CALVERT; whilst Sir ASTLEY COOPER and Mr. HOWSHIP are favourable to the *ligature*. Mr. MAYO advises this latter method for all internal piles; his mode of operating being the most judicious that can be followed. Sir E. HOME and Sir C. BELL recommend a combination of both methods — the excision of the tumour immediately after the application of the ligature. There can be no doubt of the danger of excision, and that it is very liable to be followed by great hæmorrhage, and by peritoneal inflammation, particularly when the tumours are formed by varicose veins. Numerous cases illustrative of the fatal or dangerous results of this practice are adduced by several of the authors referred to. When the piles are external, are covered by skin, and are formed as described, when considering the first form of tumour (§ 9.), excision is preferable. But I believe, from considerable experience, that either operation will be very seldom required, if the medical treatment be judiciously

conducted. Neither the one nor the other should be resorted to without a careful examination of the pathological relations of the case, and of the form, state, and complications, of the local affections; nor without a preliminary treatment, consisting of one or two small cuppings over the sacrum, of a regulated state of the bowels, moderate diet, and of abstinence from fermented or spirituous liquors. In nervous and irritable persons, either operation is hazardous, and should not be performed unless in urgent circumstances. Dr. BURNES states that he has seen "a person die of sympathetic adynamic fever in four days after the removal of piles by a most accomplished surgeon." The nervous system of this patient was disturbed, prior to the operation, the shock of which excited high febrile movement and delirium, soon terminating in dissolution."

42. E. *Treatment of Inflamed Piles*. — The application of leeches to inflamed hæmorrhoids is very often advised. MONTÈGRE disapproves of the practice, as it frequently draws the blood to the parts. I believe that cupping on the loins or on the perineum is more beneficial. As more or less stangulation produces or accompanies the inflammation, the tumours should be pushed within the sphincter, if this can be done without aggravating the affection; and poultices or fomentations applied. When the inflammation is abated, MONTÈGRE advises injections of cold water; but care should be taken not to lacerate the tumours by the pipe of the syringe, as serious consequences may accrue, as in the cases recorded by ZACUTUS LUSITANUS, GASSENDI, and others. The external application of lint, moistened with a cooling and anodyne lotion, or frequently sponging the parts with it, will often afford relief. Equal parts of the solution of the acetate of lead, and of laudanum, diluted with rosewater will generally answer the purpose. If this lotion is not of service, it may be relinquished for poultices or poppy fomentations. *Incisions* or punctures of the inflamed and protruded piles are advised by some surgeons. MONTÈGRE condemns the practice; and Mr. CALVERT states that he saw an instance of fatal hæmorrhage from having had recourse to it. Much more care should be therefore placed upon local blood-lettings in the situations just mentioned, on low diet or abstinence, and on the refrigerants and cooling diaphoretics already recommended. If the inflammation terminate in suppuration or abscess, poultices or fomentations, and as early an external outlet to the matter as can be given it, are requisite. When tenesmus is present, cupping over the sacrum, ipecacuanha with nitrate of potash and opium, in frequent doses, anodyne fomentations, and the treatment about to be prescribed for this symptom (§ 46.) are most serviceable. The bowels should be kept gently open by means of castor oil, the aperient electuaries, and other laxatives mentioned hereafter (§ 46. c.).

43. F. *Treatment of Ulcerations, Fissures or Cracks*. — a. When ulcerations form between the tumours, or on their surfaces, the parts should be carefully cleansed after each evacuation, and an ointment, with a small proportion of Peruvian balsam may be applied to it, by a pledget of lint; or any other ointment of an astringent and anodyne kind may be tried. The balsams or terebinth-

nates should be given internally, in the form of pill, with magnesia, in quantity sufficient to keep the bowels gently open.

44. *b. Fissures or cracks* between the tumours are attended either by exquisite pain, or by spasmodic constriction of the sphincter. More frequently both these latter morbid states are present; and occasionally the patient is tolerably free from both. When the lesion is thus simple, the treatment recommended for ulceration will often be sufficient; the local application of borax dissolved in honey will also be of service, as a substitute for an ointment; but when either pain or spasm of the sphincter is complained of, other means are required. In these cases I have found the addition of the extract of *belladonna* to any of the ointments usually prescribed give almost immediate relief. If a large proportion of the extract be employed, the effects ought to be carefully watched. Due attention to the functions of digestion and of excretion, and to existing constitutional symptoms, is always necessary. In less severe cases of this description, the extract of hyocyamus may be tried, before having recourse to the *belladonna*. M. BRYEN and most surgeons in this country have advised a complete division of the sphincter ani muscle for the removal of this complaint. I have treated five cases of fissured anus since 1822, when the first came under my care. In all these the operation had been recommended; and yet they perfectly recovered in a short time, and without a single exception, by means of a purely medical treatment. Strict injunctions as to diet and regimen; the daily evacuation of the bowels, and afterwards washing out the rectum by emollient injections; careful abluion of the external parts, and the application of an appropriate ointment or cerate with *belladonna*; attention to the functions of the digestive and assimilating organs, and to constitutional symptoms, and the removal of general or local plethora, constituted the treatment. The *belladonna* was added to various kinds of ointment, according to the peculiarities of the case. In all it affected the pupils, and in two, it produced its characteristic eruption on the skin. Several years ago I employed this medicine for fissured and painful spasm of the sphincter, the account of DUPUYTREN's treatment of this affection by the same means appeared in the medical journals of Paris.

45. *G. Hæmorrhoidal pains and spasmodic stricture of the rectum*, generally connected with fissure or ulceration at the bases of the tumours, must be treated in the manner just stated (§ 44.). The pains are often intermittent, but very acute, during their continuance. Sometimes they extend down to the feet and ankles, and even occasionally assume a neuralgic character in these or other parts of the lower extremities, or give rise to spasm in various parts, especially in nervous or hysterical females. Some interesting instances of such affections have been recorded by Sir B. C. BRODIE, and have been observed by myself. In such cases, much benefit will generally accrue from taking the *confectio piperis nigri*, twice or thrice daily; and from adopting the constitutional and local treatment just recommended. This medicine may also be conjoined with an anodyne, and the bowels regulated by the medicines already suggested. M. MONTEZORZ strongly ad-

vices having recourse to the "*douche ascendante*;" or the forcible dashing of cold water against the anus, and to cold injections. In order to render the evacuation more easy, he directs the lavement to be thrown up when the inclination to stool takes place. Emollient injections may also be tried, either to facilitate the discharge, or to cleanse the rectum afterwards; and *suppositories* with the *ceratum plumbi compositum*, and opium, or *stramonium*, or *belladonna*, or any other narcotic may be occasionally introduced into the rectum, and they will seldom fail of giving relief. Great care ought to be taken in the administration of narcotics in lavements in the treatment of this or any other state of the complaint as they are often rapidly absorbed into the circulation, from the rectum and colon, and without having undergone any change. I have known half a grain of the *belladonna*, in one case, and thirty drops of *laudanum* in another, produce the most serious effects. When, however, either of these, or any other narcotic is prescribed in an ointment, pomade, or suppository, no unpleasant results will follow.

46. *H. Tenesmus, strangury, and constipation* often depend upon the same pathological states.—*a. The tenesmus* is generally owing to inflammatory irritation and congestion of the inner coats of the rectum, conjoined with spasmodic action of the muscular tunic. It will, with few exceptions, be removed by the means just directed (§ 42. 45.). In less acute, or more obstinate cases, the *belladonna* plaster may be applied to the perineum or sacrum. Five or six grains of the extract of poppies, or one or two drachms of the syrup, may also be occasionally thrown into the rectum, with any tepid emollient enema; or a suppository of the kind just stated may sometimes be introduced.—*b. If strangury or dysuria* supervene, it is to be imputed to the extension of the affection of the rectum to the neck of the bladder, or to the prostrate and urethra; and it will generally be found that it will be removed or relieved by the treatment recommended for *tenesmus*.—*c. Constipation* also frequently proceeds from the same local changes as occasion *tenesmus* and *strangury*, and from tumours or enlarged and congested vessels obstructing the canal of the intestine. In either case, there is more or less obstacle to the passage of a consistent motion, and much pain attending it. If these symptoms be allowed to continue, the complaint will be aggravated; or they will give rise to still more serious changes. In removing them, the milder laxatives will be found more serviceable than active purgatives; but those which act also upon the liver should be selected. Mercurials aggravate and even bring on *tenesmus*, and therefore cannot be employed, with the exception of *hydrargyrum cum creta*. This may be taken in small doses at bed-time, with *ipecacuanha* and *hyoscyamus*, or with extract of *taraxacum*. Some one of the electuaries already prescribed (§ 38.), or the decoction of *taraxacum* with the subcarbonate of soda, or the tartrate of potash with tincture of senna and syrup of roses, or of senna may be given, and continued for some time. A Seidlitz powder taken about an hour before breakfast is also one of the best aperients in hæmorrhoidal cases. A frequent recourse to warm lavements is injurious in this complaint, as they relax the parts, and solicit the circulation to them.

M. MONTAGNE, whose authority in this matter is very high, advises the injection of cold water in preference, as it strengthens the bowel; but he directs no more than will fill the rectum (about half a pint) to be thrown up. In the more severe states of the disease, especially in cases of fissure, of spasm of the sphincter, and of painful evacuation, he considers the cold injection, every time that a motion is about to be passed, most beneficial.

47. I. *Re-establishment of Suppressed Hæmorrhoids.*—When the suppression or interruption of piles is followed by aggravation of some related complaint; or injures the general health; or threatens some important organ, as the lungs, brain, liver, &c., there ought to be no hesitation as to having recourse to means calculated to reproduce them. A gentleman of about fifty, residing near Russel Square, subject to returns of humoral asthma often passing into bronchitis, as well as to frequent attacks of hæmorrhoids, experienced great aggravation of the former, in 1835, after the latter had disappeared for some time. I directed him to be cupped, but he neglected to adopt my advice: I therefore prescribed a full dose of calomel and aloes, and repeated it in a few hours, with the view of restoring the suppressed piles. This had the desired effect; but severe inflammation of the tumours and strangury supervened, followed by an abscess between the prostrate and anus. This broke externally, and soon healed; and the patient has not been confined a day since. Another gentleman, between fifty and sixty, had experienced severe headaches from the non-appearance of the hæmorrhoidal discharge. He was advised, in 1829, when I saw him, to lose blood; to live abstemiously, and to relinquish malt liquors. The first only of these injunctions was complied with, and his complaints returned. The same advice was again given, and the purgatives formerly prescribed were changed to those which act more energetically on the rectum. The hæmorrhoids were reproduced, and the headaches disappeared. Such instances are, however, not at all uncommon. Unless in urgent cases, it will be preferable to attempt the restoration of piles by the more gentle means at first, as the exhibition of those which are most irritating, before the action of milder remedies is ascertained, may excite inflammatory action, of a very severe kind, and great distress, as in the case first adduced. A reference to the causes which commonly occasion the complaint will show the means most likely to reproduce it. The most appropriate, however, are pediluvia or semicupia; the hip-bath; the application of leeches to the anus; the use of purgatives which act especially on the rectum, as calomel and other mercurials in full doses; aloes, colocynth, rhubarb, sulphate of soda, &c.; warm injections; aloetic enemata, &c.

48. K. *Of Regimen and Prophylaxis.*—An abstemious regimen is required during the attack, and is even more necessary in the intervals; for it is chiefly by diet, and prudent conduct, at these times, that this complaint, and its contingent ills, are to be warded off. A temperate climate is best suited to persons liable to hæmorrhoids; but sudden vicissitudes of weather are unfavourable, and should be guarded against, by wearing flannel next the skin, and by warm clothing. Malt and spirituous liquors ought to be avoided; and tem-

perance in food and drink should be observed. Too warm and soft beds are improper; and sitting on soft warm cushions is still more so. Irregularity in the hours of eating, sleeping, waking, and taking exercise, is generally of service, and when medicine is requisite, it should be such as will correct morbid action, increase scanty secretion and excretion, particularly of the biliary and mucous surfaces, and preserve the bowels regularly and gently open. Cold ablation of the anus, after each motion, and, if hæmorrhoidal tumours protrude, the careful sponging of them before they are returned, will not only remove disorder, but prevent its return, if continued without interruption in winter as well as in summer. Venereal excesses, the more violent mental emotions, and all the depressing passions, are injurious. Exercise in the open air, especially on horseback, is always of service if taken regularly, although rough-riding, especially by those who are not accustomed to it, is often a cause of the complaint. — (See also *RECIPE* — *Diseases of*.)

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HAIR — ALTERATIONS OF.

CLASSIF. — GENERAL PATHOLOGY — *Symptomatology*; *Ætiology*; — SPECIAL PATHOLOGY, and THERAPEUTICS.

1. The hair being an appendage of the skin, and the natural covering of one of the most important parts of the body, material changes in its state or appearance are interesting to the medical practitioner, as furnishing indications of several pathological conditions. Nor is the growth or removal of the hair devoid of importance, especially in certain diseases, and in convalescence from dangerous maladies. The various alterations presented by the hair are rarely primary or idiopathic, and seldom even depend upon local changes merely; but are usually the more remote consequences of debility and chronic disorder of the digestive organs, frequently associated with superinduced affections of the skin and of the

pilous follicles, and occasionally also with general cachexia. In many instances where the hair undergoes a marked change, the nails likewise present more or less alteration.

2. I. EFFECTS OF REMOVING THE HAIR. — The consequences of removing the hair depends, 1st, upon the quantity of hair removed from, and left upon, the scalp; 2dly, upon the states of the system and of the circulation in the head at the time of removal. When a person is in good health at the time, little further results from cutting off the hair than headach, cold in the head, or earach, or sore throat. M. JOURDAN states, that when the long hair worn by the soldiers in the revolutionary war was cut off in all the regiments, many complained of headachs of several weeks' continuance; but he was not aware of any fatal effect being produced. The removal of the hair in cases of inflammatory excitement of the brain, or in that sthenic state of vascular action which requires having recourse to cold applications or the cold affusion, can seldom be productive of injury, although it seems very doubtful if it be so beneficial as is very commonly supposed; but it is very different in other circumstances. In adynamic, nervous, low, or typhoid fevers, or in exanthematous fevers presenting these characters — and still more especially during early convalescence from these, the removal of a large quantity of the hair very close to the scalp sometimes aggravates the symptoms. During the advanced stages of these diseases, the circulation in the scalp, and the perspiration from it, are checked, and congestion, or even serous effusion, is either thereby favoured, or induced, or increased. Therefore, in these low states of action and of vital power, the hair should not be shaved or closely cut from the scalp, unless when a blister is about to be applied in this situation. During convalescence from these or other dangerous maladies, the early removal of the hair, particularly when long or thick, is not without risk. SINGER, VASSAT, LANOIX, ALIBERT, JOURDAN, and others, have met with dangerous and even with rapidly fatal effects from this measure. The risk from it is great in proportion to the quantity of hair removed, and of the perspiration proceeding from the scalp. I have seen, in several instances, ill effects follow the removal of long thick hair from the heads of delicate children and females. In children thus constituted, the hair should always be kept short; and, if it be allowed to become abundant, it ought not to be closely cut at once. Whenever much hair is removed, a warm covering to the scalp should be immediately substituted, and worn for some time afterwards. Persons strongly constituted, and taking regular exercise in the open air, may not experience any disorder from the neglect of this precaution; but the weak, or the exhausted, or convalescents, will generally suffer if they act contrary to this advice.

3. Persons in the habit of wearing long beards, have often been affected with rheumatic pains in the face, or with sore throat, upon shaving them off. In several cases of frequently recurring, or of chronic sore-throat, wearing the beard under the chin and upon the throat has prevented a return of this complaint.

4. On the other hand, the removal of the hair, or keeping it closely cut, is often productive of

good effects: I have seen it of service in headaches. Frequent cutting promotes the growth of the hair, and admits of the usual operations of brushing and combing acting more efficiently on the scalp. In cases requiring cold sponging, the shower-bath, &c., shortness of the hair is an advantage. MORGAGNI (*Epist. viii. Art. 7.*), GRIMAUD, RICHERAND, and others, have adduced instances of recovery from mania, headaches, and various nervous affections, by keeping the head closely shaved. Whether the hair has any influence or not in retarding the passage of positive electricity from the body, or in otherwise affecting the electro-motive or galvanic actions taking place in the system, it is difficult to determine; but it seems very probable that it has.

5. II. OF EXCESS OF HAIR.—A. *General excess of hair* is not often seen. I knew two persons whose bodies were so thickly covered with hair, excepting the parts of the face, hands, and feet, that are usually devoid of it, as nearly to prevent the skin from appearing through it. Both were remarkable for strength and endurance; and in both the hair was dark brown. Their joints were small, the muscles uncommonly developed, and the adipose and cellular tissues scanty.—B. *Partial excess of hair, or the growth of hair in unusual parts*—*Extraneous hair*—the *Trichosis hirsuties* of GOOD—is very common. The most frequent examples of it are in sterile women, who often have more or less of a beard after they pass the age of thirty. Since HIPPOCRATES, growth of the beard in females has been imputed to deficient menstruation; but there are very numerous exceptions to this. Dr. GOOD states that one of the most striking cases he ever observed was in a woman who was subject to excessive menstruation, and who died at forty. The growth of hair on the upper lip is sometimes seen in young, as well as in aged women; and, either on the chin chiefly, or on both the chin and upper lip, is often met with in females about or after the change of life, and occasionally even in those who have had several children.—a. Tufts, or patches of hair, in situations where none is generally seen, have been frequently met with. When the patches are small, they have been usually denominated *navi pilares*, or hairy navi. In rare instances, however, they have been remarkably large. Cases are adduced by RAYER, GRIVET, BICHAT, DUFOUR, and others, in which these patches covered a large portion of the surface of the body, were of a brownish hue, somewhat elevated above, and quite different from the colour of the surrounding skin.

6. b. The hair also, in its natural situations, may acquire a remarkable length. This is not a rare occurrence as respects the hair of the head; but it is very seldom met with in other places. BRÜCKMANN saw the hair of the head reach the ground; and OTTO refers to an instance of the pubic hair of a female being an ell and a half long. The premature growth of hair in natural situations, as on the pubis, chest, &c., has been sometimes seen, especially in connection with the too early development of the genital organs. Several instances of this kind are on record.

7. c. The growth of hair on mucous membranes has been met with in rare instances; in different parts of the digestive mucous surface (WALTHER, OTTO, VILLERME, &c.), of which various cases are referred to in the *Dictionary of Medical*

Sciences (vol. vii. p. 37. *et seq.*), in the gall-bladder (BICHAT), in the uterus and vagina, (MECKEL, &c.) and in the urinary bladder (CRUVEILHIER, &c.). But it is extremely doubtful that the hair was developed in some of the situations where it has been found, as no information, in most of the cases, is given as to its roots. It is more probable, therefore, that it was introduced from without, or had accidentally passed into these situations.

8. d. The development of hair in the interior of cysts is more common, and has been more accurately observed. These cysts have been most frequently found in the ovarium, in the substance of the uterus, below the skin, and in various other parts. They seldom contain hair only, but more frequently also fatty matter, bones, teeth, &c. The hair is sometimes attached to the interior of the cysts, but it is more frequently entirely detached. It would appear, from the observations of WARREN, TUMIATI, BOSCH, SCHACHER, MECKEL, and others, that it is formed from rootlets or bulbs, as in the skin; and that in consequence of an alteration in these, it often becomes entirely unconnected with the surface from which it was formed. The researches, however, of TYSON, MORAND, BICHAT, and CRUVEILHIER, do not confirm this view, as, in the cases they met with, the hair was not attached at one of its extremities, either to the cyst, or to the other matters which the cyst contained. From the circumstances of these cysts being found most commonly in the ovaries, their formation has been imputed to an imperfect or unaccomplished coition. The fact that they have been sometimes met with in the ovaria of females, who had not reached puberty, or in whom the hymen was unruptured, has been considered to militate against this mode of accounting for their formation. But this objection to the doctrine is not valid; as it merely shews the impossibility of complete coition having taken place, and is no proof that the act has not been attempted.

III. MORBID STATES OF THE HAIR.—CLASSIFICATION.—6. Class, 3. Order (Good). IV, CLASS. IV. ORDER (Author).

9. i. The hair of the head may become weak, slender, and may split at the extremity. This is the *Trichosis districta* of GOOD, or *forked Hair*. This is a common affection, and depends upon a deficiency of action of the bulb of the hair, in consequence of debility, or impaired vital power, frequently connected with weakened digestion and assimilative function.

10. ii. The hair is sometimes rigid, crisped, and hard. It is then usually very short and rough, and harsh to the touch. This state seems to depend upon a deficient secretion of oily matter, by which the hair is covered and protected. It is more rarely bristled—*Trichosis setosa* of GOOD. This alteration is noticed also by PLENCK, but in a loose and unsatisfactory manner. Of the crisped and dry state of the hair, I have seen some instances; of the bristled, I have not known even of a single case.

11. iii. The Treatment of these states of the hair consists in frequent cutting, and in the use of the local applications advised for loss of hair (§ 32.), more particularly the ointment prescribed at that place. Attention should also be paid to the digestive, assimilating, and excreting functions; as

I have never seen either of those affections of the hair unconnected with disorder of these functions.

12. III. **FELTING OR MATTING OF THE HAIR**—*Fulse Plica*.—The long hair of persons, who have neglected it, frequently becomes felted, or inextricably interlaced. Females after long illnesses are subject to it, particularly in Poland, and other countries where cleanliness in respect to the head is so much neglected. It is somewhat favoured by a morbid secretion from the scalp, and is occasionally met with in connection with *porrigo favosa* and other chronic affections of this part. It has been particularly noticed by DAVIDSON, KRAUZE, BOYER, GASC, and other writers on *Plica*, and been confounded by many authors with that disease. JORDAN and RAYER have, however, pointed out the great differences between them. Felting of the hair occurs independently of any alteration of the hair itself or of its bulbs, and without the constitutional and local disorder ushering in or attending *plica*. (See § 34.)—The remedy for it is obvious.

IV. **LOSS OF COLOUR OF THE HAIR**.—*SYN.*

Canities; Πολιότης, πολίωσις, (from Πόλος, white, hoary); *Trichosis polinis*, Gpud; *Cunitia*, Auct.

13. **DEFIN.** *Hairs prematurely grey, hoary, or white.*

14. i. **HISTORY**.—Loss of colour of the hair may be accidental, premature, or senile; and it may be partial or general. The hair begins to be grey first at its free extremities; but it often changes in that portion which is nearest the skin. This latter circumstance shows that the hair has been first secreted of its natural colour, and afterwards secreted grey or white, in consequence of an affection of its bulbs, and is frequently observed when the loss of colour has been preceded by *eczema*, or any other chronic affection of the scalp. Men usually begin to get grey about forty, many between thirty and forty, and some not until a more advanced age. The occurrence of gray hairs in persons under thirty is not rare; and I know two individuals, one a male, the other a female, considerably upwards of seventy, who have thick dark hair, without any being grey. The hair of the head is that which first loses its colour from the change usually commencing on the temples; the white hairs are at first few, but they multiply. When they fall out, they are not reproduced, so that baldness often follows. Females generally retain the colour of their hair longer than males, and the fair longer than the dark; but fair hair often falls out at an early age.

15. **Canities**, either partial or general, is very rarely congenital, or observed in childhood. The very fair, or almost white hair, with which fair children are sometimes born, is not the change under consideration. Greyness of parts only—in tufts—has been often noticed, and is owing to some affection of the scalp in those parts. This partial loss of colour may occur on the head, in the beard, or in other situations. Instances of this kind, and of the change taking place on one side only, have been recorded by LORRY, LUDWIG, HAGEDORN, RAYEN, and others, and are by no means rare. Loss of colour of the hair commonly is gradual and slow; but in some cases the change has taken place in a few hours, or in the course of a single night. The case of Mary Queen of Scotland has been often adduced,

and others are mentioned by VOIGTEL, BICHAT, CASSAN, and RAYER. When hair grows from cicatrices without pigment, it is colourless. and in general or partial leucopathia, the hair is white or grey in most instances. In senile canities, however, the scalp seldom participates in the loss of colour.

15. ii. **CAUSES**.—A. The remote causes of premature canities are—disappointments, anxiety of mind, extreme or protracted grief; unexpected and unpleasant intelligence; fear, fright, or terror; great mental exertion; paroxysms of rage or anger; severe, repeated, or continued headaches; rheumatism of the head and toothach; the salts from the evaporation of salt-water from the hair; eczema and other chronic eruptions of the scalp; over indulgence of the sexual appetite; excessive hæmorrhage or other discharges, mercurial courses, and an hereditary predisposition.

17. B. Blanching of the hair appears to arise from a diminished secretion of the colouring matter by the bulbs or follicles. Dr. MACARTNEY thinks very justly that an organic action must be admitted to exist in the substance of the hair, in order to account for the changes to which it is subject, and which sometimes takes place so rapidly as otherwise not to admit of explanation. M. RAYER states, “that grey hairs have been said to be without marrow or matter in their interiors, in place of which there is an empty canal.” VITTHOR says that the bulbs of those hairs which have become white are somewhat atrophied, and Dr. MACARTNEY thinks that the change is owing to the absorption of the colouring matter when it takes place rapidly.

18. iii. **TREATMENT**.—When canities is the result of age and of partial or general leucopathia, it cannot be made the subject of medical treatment. But when it is partial or depends upon chronic inflammation of the scalp having extended to the bulbs of the hair, the removal of this state, and of the white hairs, is sometimes followed by the production of hairs of the natural colour. Various means of dyeing the hair have been resorted to; but these are unworthy of notice. Applications to the hair, with the view of preventing it from becoming grey or falling off, have been frequently employed. Amongst these, the prepared marrow of the ox or deer, bears’ grease, honey-water, and substances mentioned hereafter (§ 32.), are most deserving notice.

V. **PRETERNATURAL COLOUR OF THE HAIR**.—*SYN.* *Miscoloured Hair; Trichosis Decolor, Good.*

19. The hair may be changed from a very light to a very dark colour. Instances of this have been adduced by ALIBERT and others, and are not infrequent. It may be also changed to a reddish yellow, and even to green or blue. It has likewise been observed of a spotted or variegated hue; this, however, is not uncommon. Hair that has become grey has, in very rare cases, been changed to black. The instances in which the hair has been said to have been green or blue have most probably arisen from the action of metallic fumes on hair of a light colour. The subject is more fully discussed by M. RAYER, but it is not deserving of further notice.

VI. **THE WANT OR LOSS OF HAIR**.—*SYN.* *Alopecia; ‘periu; ‘ἀλωπικία (from ἀλωπᾶν, a fox), Galen; Area, Celsus; Gangrena Alopecia, Young;*

Alopecia, Swediaur; *Defluvium Capillorum*, Sennert; *Fluxus Capillorum*, Auct. var.; *Der Kahlkopf*, *Kahlheit*, Germ.; *Chauceté*, *Calvitie*, *Alapécie*, Fr.; *Calverza*, Ital.; *Baldness*.

20. DEFIN.—The defect or loss of hair, either limited to one or more parts only, or diffused and more or less general.

21. Alopecia may be congenital, and is then owing to the tardy development of the hair; which often does not appear until the end of the first or second year. This form of baldness is, however, very rarely permanent. If it is, the circumstance is to be imputed to the absence of the follicles.

22. Decay of the hair may take place in various states of the scalp and of the constitution. It may occur either prematurely, or as a consequence of age. In the former case it is the result of disease, and is either limited—partial, but complete, as far as it extends—or diffused, and more or less general: in the latter it is always diffused, and depends upon the change which the integuments of the body undergo at that period of life. I shall consider, first, limited or partial alopecia, and, secondly, diffused alopecia; this latter comprising, (a) Premature loss of hair, and (b) Decay of the hair from age.

i. LIMITED OR PARTIAL BALDNESS.—SYN. *Ὠφιασίς*; (from *ὄφις*, a serpent); *Ophiasis*, Celsus; *Aren*, Auct. var.; *Alopecia Arcata*, Sauvages; *Porrigio Decalvans*, Willan, Bateman; *Trichosis Aren*, Good; *Alopecia partialis*, *Alopecia circumscripta*.

23. CHARACTER.—Bald patches often without decay or change of colour of the surrounding hair, the bare spots being shining and white, frequently spreading or coalescing.

24. Partial alopecia is the consequence of various alterations of the secreting follicles of the hair induced by impetigo, fevers, chronic eczema, scyosis, &c. The variety described by WILLAN, under the name of *Porrigio decalvans*, is the most remarkable which comes under the present head. The scalp, or skin of the chin or cheeks of persons affected with it, presents one or more patches, frequently of a circular form, entirely devoid of hair, although surrounded by that of the natural growth. The skin of these patches is smooth, without redness, and unusually white; and their areas extend gradually. When several exist near each other, they ultimately unite. A large portion of the scalp may be thus denuded of hair. Neither vesicles nor pustules, nor any other kind of eruption can be detected in the surface of these patches. This affection occurs commonly in the hairy scalp, and in children; but it is not infrequent in adults, and in the beard. In children it often assumes an irregular serpentine or winding form. I have seen it in them associated with various disorders of the digestive organs, and occasionally with those of the brain; but it has also been apparently independent of any internal affection. Dr. ELLIOTSON has seen it in a child with disease of the brain (*Lond. Med. Gaz.* vol. vii. p. 639. and v. viii. p. 30.). The cases which I have met with in adults were not connected with any other disorder. I agree with GOOD, RAYER, and TODD, in viewing it as a variety of alopecia, and entirely unconnected with *porrigio*.

25. A variety of partial alopecia has been noticed by MM. MAHON and RAYER, that differs from the preceding chiefly in the appearance of the affected surface, and in the presence of a few altered and brittle hairs. In this latter respect, it nearly approaches the morbid state of the hair already mentioned (§ 10.). On one or more circular patches, the hair seems broken off to within a line or two of the skin. The surface of the patches is dry, appears rough to the eye, and feels more so to the touch. It is slightly bluish, and a fine white powder can be detached from it. The affection begins at a point, and spreads; similar spots forming in the vicinity of the one which first appeared. These may extend until nearly all the scalp becomes affected.

ii. DIFFUSED ALOPECIA.—SYN. *Calvities*, *Depilatio*, *Defluvium Pilorum*, Auct. var.; *Trichosis Atheris*, Good.

26. CHARACTER.—The decay or fall of the hair occurring in a diffused or general manner; the hair becoming gradually thinner, commonly at first on the crown, or on the forehead and temples.

27. Decay of the hair in a gradual and diffused manner may take place prematurely, and as a consequence of disorder of the digestive organs, or of the constitution, or of a local affection of the scalp extending to the pilous follicles. It is often an indication of premature exhaustion of organic nervous energy.—Congenital absence, or defective development of the hair of a permanent kind (§ 21.) has been rarely observed. Instances of it have been recorded by HEISTER, DANZ, WALLS, and RAYER. Premature loss of hair is not confined to the scalp, but often extends to the eye-brows, beard, and other parts of the body. It may be even general. Mr. SOUTH (*Translation of Otto's Pathology*, p. 120.) mentions a case most probably of this kind. A total loss of hair, however, is more common than general defective development of a permanent kind; and is met with chiefly in mature or far advanced age. J. P. FRANK saw it in a young man; and instances of its sudden occurrence are recorded by PAULINI, and HEISTER, and in the *Journal de Médecine* (t. xiv.), and in the *Berlin Medical Transactions* (t. iii. p. 372). Most commonly the hair of the head, of the axillæ, and pubes, gradually and successively fall off. In rare instances the hair has been renewed of a finer quality, as in the case recorded by LEMERY and BONINA (*Journ. Progrès*, &c. t. xiv. p. 244.). A singular case of baldness confined to one side of the body is related by RAVATON.

28. CAUSES.—A. The remote causes of baldness are—1st, Whatever debilitates and exhausts the system, as profuse or prolonged discharges; dangerous hæmorrhages; masturbation, or immoderate indulgence of the venereal appetite; low, typhoid or adynamic fevers; care and disappointments; the depressing passions and anxiety of mind; excessive application to study; the contact of rancid, septic, or putrid animal matters with the scalp; more rarely the syphilitic poison, and the frequent or prolonged use of mercury. It may also be caused by exposure to the sun's rays, by the fumes of quicksilver, by the friction of a military cap or helmet, by eczema or other chronic eruptions of the scalp, and by the use of tobacco. It has been said to be endemic in some places. LEO AFRICANUS has stated, that baldness is com-

mon in Barbary; Tournepfort, that it is almost universal in Mycone, one of the Cyclades; and Sir R. Sibbald that it was frequent in Shetland in his time, owing to the fish diet of the inhabitants. That living chiefly on fish, and on poor unwholesome food may aid in its production, is not improbable. The salts of sea-water left in the hair will sometimes cause it indirectly. Extreme distress of mind has produced a general loss of hair within twenty-four hours; but such instances are extremely rare. Since Hippocrates, it has been said that eunuchs do not become bald; and Schenck remarks, that baldness does not commence, until after the generative functions are exercised. It is certainly much less frequent in females than in males.

29. HISTORY AND PATHOLOGY:—A. The fall of the hair may take place in a few days, or even in a shorter period; or so slowly as to escape observation. The skin of the denuded part usually presents the ordinary appearance, especially in senile alopecia. In some cases, it is pale, or of dead whitish colour, and furfuraceous; and occasionally it is covered by scurf, or scales, and is distinctly inflamed. In the former case, its sensibility is not materially altered; in the latter there are heat, itching, or picking. The hair is often more or less altered before it falls out, being thin, harsh, dry, weak, and stunted, or deprived of colour. This is most frequently the case when it proceeds from causes acting directly on the scalp, and from chronic eruptions of this part.

30. B. Loss of the hair proceeds from changes in the bulbs:—1st, From atrophy or wasting of the follicles, as in senile alopecia, and in that state of the affection which is produced by excessive venereal indulgences;—2d, From an impaired or suspended vital action of the pilous follicles, as in the alopecia that takes place suddenly or rapidly from mental emotions, &c.; in that which follows malignant adynamic or putrid fevers; and in that variety which has generally been known by the name of porrigo decalvans,—and, 3d, From chronic inflammation, extending to the bulbs. Equally with a knowledge of the particular affection of the follicles or bulbs to which the affection is to be imputed, is the investigation of the actions with which it is related, or upon which it is dependent. Although alopecia is often distinctly local and primary affection, proceeding entirely from local causes, yet it as frequently depends upon disorder of the digestive and assimilating organs, and upon the general state of the system. As Dr. T. J. Todd justly remarks, it may arise not only from a change primarily induced in the follicles, but also from the extension of disease to them from the tissues in which they are situated. In this latter case, the alopecia may be also local, but it is consecutive, the follicles being altered by becoming involved in the inflammation constituting an adjacent cutaneous disease. The baldness following eczema, porrigo, impetigo, &c. is an illustration of this.

31. C. Alopecia is most frequently symptomatic of debility or cachexia, produced by the exhausting causes enumerated above (§ 28.). After fevers, the hair is generally exfoliated with the cuticle, and sometimes even with the nails; but as the follicles have their vital actions restored, the hair is reproduced. When, however, the hair falls

out in phthisis, diabetes, and other cachectic maladies, no attempt at restoration takes place. Alopecia may also be symptomatic of chronic inflammation of the digestive mucous surface. Indeed, this is a frequent cause of it. The connection of this state of the digestive organs with chronic cutaneous eruptions is fully established and well known; and the pilous follicles are sometimes the parts of the integuments affected thus sympathetically; the affection implicating them either principally or solely, or in conjunction with other parts of the skin. This dependence upon, or connection with, derangement of the digestive and even of the biliary functions should never be overlooked in practice; for, although I cannot agree with Broussais and his followers, that the external change is produced by the internal inflammatory irritation, or that the internal complaint is so generally inflammatory in its nature as they would make it appear, yet I am convinced that there is a very close connection often existing between the internal and external affection; both affections generally proceeding from, and being associated by, the same pre-existent disorder; which disorder may generally be referred to the state of organic nervous function or power.

32. TREATMENT.—A. In limited or partial alopecia, more particularly that variety usually called porrigo decalvans, and in all those cases that appear independently of inflammatory action—that depend upon the first and second pathological states enumerated above (§ 30.)—stimulation of the parts, by the decoction of walnut-tree leaves, or of the leaves of the solanum,—by the infusion of rosemary, or of the lesser centaury, or of mustard seed,—by various spirituous and aromatic washes,—by ointments containing the tincture of cantharides, or some essential oils,—or by embrocations of thyme, lavender, the juice of onions, of garlic, &c., has been very generally recommended. M. Rayer, however, does not consider this practice very successful. Dr. Willis has seen the common mercurial ointment prove of service. The balsam of sulphur, applied to the scalp, is praised by Ruland; a solution of the sulphate of copper in spirits, by some recent writers, and blisters by Arndt. I have seen a strong solution of the nitrate of silver, in some instances, and either an infusion of capsicum, or ointments with the tincture, in others, applied to the affected surface, and persisted in for some time, restore the hair. Dupuytren generally prescribed an ointment with a strong tincture of cantharides. I have, in several cases of baldness, of the kind under consideration, employed an ointment containing the balsam of Peru with complete success. It has the effect of rendering the hair thick and persistent, and in promoting the growth of it in parts from which it had fallen out from impaired action of the follicles. The following is the formula that I have usually employed.

No. 244. R. Adipis Præparatæ 3ij; Cerae Albæ 3ss. i. lento igne simul liquefact, tum ab igne remove, et, ubi primum lentescant, Balsami Peruviani veri 3ij; Olei Lavandulæ ʒij xij. adijce, et assidue move donec refrig. erit.

33. When alopecia proceeds from eczema, impetigo, fevers, &c., the treatment should be entirely directed to the removal of these eruptions. When this is accomplished, and the skin remains dry, tense, or furfuraceous, the part should

be shaved, and the surface anointed with the above ointment, or with some substance of a similar nature, as an ointment with the oil of mace, &c. The tincture or infusion of tobacco, as recommended by ZACUTUS LUSITANUS, and often empirically resorted to, will also be of service in this and in some other states of the disorder. In every form of the affection, the digestive, assimilating and excreting functions should be regulated or assisted; and associated internal congestions, or inflammatory irritations removed by appropriate means. Alopecia, as well as premature greyness of the hair, is often caused by disorder of these functions, and associated with these internal diseases; and neither the one nor the other can even be retarded in their progress, unless the treatment be directed with a strict reference to these pathological connections.

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VII. TRICHOMATOSE HAIR. — SYN. Τριχμα, Plica Polonica, Plica Polonica Judaica, Auct. var.; Plica Saxonica, Linneus, Vogel; Plica Belgarum, Schenck; Trichoma, Manget, Sauvages, Cullen; Lues Sarmatica, L. Polonica, L. Trichomatosa, Auct.; Trice, Trice incuborum, T. Scroforum; Cirragra, C. Pollonorum; Affectio Sarmatica; Ilelotis, Agricola; Ecphyra trichoma, Young; Trichosis Plica, Good; Plica, Rayer; Plica Cachectica, Author; Weichselzopf, Judenzopf, Germ.; Gwozdziec, Pol.; Plique, P. Polonoise, Fr.; Plica Polonica, Ital.; Plicose Hair, Felted Hair, Cachectic Plica.

CLASSIF. — 3. Class, 3. Order (Cullen).

6. Class, 3. Order (Good). IV. CLASS, IV. ORDER (Author).

34. DEFIN. — The hair thickened, softened, felted, and agglutinated by a morbid secretion from their bulbs and from the scalp.

35. The anomalous development and agglutination of the hair, occasionally observed in Poland, and more rarely in some adjoining countries, and peculiar to them, has attracted much attention during the two last centuries. It frequently appears in the course of some acute or febrile disease, or of some chronic internal complaint; but it also occurs, although more rarely, as the primary or principal malady. Hence it has been considered by some writers as an idiopathic disorder, but by others, and very recently by Dr. MARCINKOWSKI and BRIÈRE DE BOISMONT, who had frequently seen it in Poland, chiefly as a contingent critical affection.

36. i. DESCRIPTION. — After an attack of acute fever, characterised by languor, pains in the limbs and head, vertigo, an invincible disposition to sleep, rushing noises in the ears, pains in the orbits, injection of the conjunctiva, coryza, and sometimes clammy sweats, indications of plica are sometimes observed. Occasionally the febrile disorder is attended by redness of, or by eruption on the skin, and an offensive perspiration. M. LEBRUN and the writers just named state, that it may occur in the course of any acute or chronic affection of the brain, or of the viscera of the chest or abdomen; and that, although often is observed in the young and not always is preceded and attended by a febrile or internal disease. Hence the remarkable differences in the descriptions of the occasional symptoms attending it, as furnished by authors; and hence the reason for viewing it as proceeding from a cachectic state of the constitution developed by these complaints, and by the peculiar habits and circumstances of those attacked by it. According to this, the opinion of Drs. MARCINKOWSKI and BRIÈRE DE BOISMONT, that it is generally critical, and should be treated by means directed to the primary disorder, will appear perfectly rational. M. JOURDAN and others contend that it is both primary or idiopathic, and critical; and that in the first form it appears suddenly or in a short time, attended by severe pains, resembling those of rheumatism or gout; in the second, it supervenes slowly, in the advanced course of various affections different in nature and character, but generally accompanied with viscous perspirations of the head. The scalp is most commonly or chiefly affected; but the hair in other situations and the nails are frequently also implicated.

37. The scalp is sore to the touch, excessively sensible and itchy; a clammy offensive sweat exudes from it, and agglutinates the hair, which loses its lustre and appears thickened, softened or distended by a glutinous fluid of a reddish or brownish colour. This fluid is produced at the extremities of the bulbs, and is transmitted to the ends of the hair. A peculiar offensive smell attends this exudation from the hair and scalp. The hair is matted or agglutinated in different ways — sometimes in single locks, of various thickness and length, resembling ropes — *male plica* — *plica multiformis*. Occasionally the hair is stuck together in one mass or cue. *Plica caudiformis*; and in other instances it is felt into a mass or cake, of various sizes — *Female plica*. The hair of the beard, pubis, and axillæ, may also present similar appearances. When thus diseased, the hair often acquires a great length. Instances of its reaching the length of some yards are adduced by the writers referred to at the end of this article. Professor KATZSCHMIDT possesses the pubes of a female, the hair of which may have readily reached round the body. The surface of the scalp is often covered with superficial ulcerations, or with incrustations formed by the morbid exudation; and numbers of *pediculi* are frequently seen in this and in other parts of the body. The nails of the hands and feet commonly become long, hooked, yellowish, livid or black.

38. MECKEL injected the scalps of two persons who died with plica, but none of the injection reached the bulbs of the hair. J. FRANK and LA FONTAINE found the hair-bulbs much enlarged, and full of a yellowish glutinous fluid; GILBERT also observed them distended by a dark fetid matter. SCHLEGEL states that the hairs are enlarged, and filled with a yellowish brown fluid; and ROLFINCH and VICAT say that they are so frequently distended with this fluid as to burst, and to discharge it externally. Similar changes have been observed by GASC and others. M. ANDIN remarked the bulbs to rise above the level of the skin, within the infundibuliform sheath of the root of the hair, as the papilla or feather elongates and produces the young bird (RAYN). M. SEDILLOT, examining trichomatous hair with a microscope, the internal canals much larger in healthy hair, and the cellular cavities of the canal much more distinct than usual. The hair neither bleeds when divided, nor is sensible, has been shown by BOYER and others. The morbid sensibility attending the complaint is seated in the scalp and hair-bulbs.

39. ii. CAUSES. — Plica is said to have first appeared in Poland near the end of the thirteenth century. The earliest writers on the disease speak of it as well known. It is now wearing out. It has always been more frequent on the banks of the Vistula and Borysthenes, and in damp and marshy places, than in other parts of Poland. Very rare instances of it have been met with in Holland, Saxony, and some other places in Germany. Its endemic origin seems well established. LA FONTAINE states that, in the provinces of Cracow and Sandomir, plica affects the peasantry, beggars, and Jews, in the proportion of two thirds in ten; the upper classes in that of two in thirty or forty. In Warsaw and the vicinity, it attacks four out of

forty or forty-five of the former class; and three out of ninety or a hundred of the latter. He assigns the same proportions to Lithuania as to Warsaw, and the same to Volhynia and the Ukraine as to Cracow. SCHLEGEL, GASC, HARTMANN, and other recent writers, consider that the disease is not nearly so frequent as here stated. This malady appears in the human species primarily; and it is said also to affect the lower animals; but there has been no proof adduced of its transmission from the former to the latter. It has been supposed to be contagious, but this opinion has been shown to have been unfounded.

40. a. Amongst the remote causes of plica, wearing the hair long and applying to it oils and ointments, often rancid (GILBERT); neglect of personal cleanliness; keeping the head warm or covered with thick woollen or fur caps; using heating aromatic substances to the head, and covering it with warm applications and dresses with the view of procuring a critical discharge from it, especially in rheumatic or other diseases of this part, are the most influential. SCHLEGEL imputes plica chiefly to the use of semi-putrid fish, and damp residences; and doubtless these often concur with the foregoing in predisposing to, or in exciting, the affection.

41. b. M. JOURDAN considers this complaint, in respect of its nature, to consist of an increase of the vital functions of the bulbs of the hair and of their secretions, with augmented sensibility. BALDINGER imputes it to rheumatic acrimony, attended by an increased secretion from the bulbs. FRANCK, WOLFRAMM and LARREY view it as a consequence of, or as connected with, secondary syphilis; and many of the writers referred to, as a critical discharge, determined to the hairy scalp, by the concurrence of several of the causes just enumerated. By most of the authors, however, who have closely watched this affection, it has been considered as *sui generis*, and as seated essentially in the bulbs of the hair. SCHLEGEL, LA FONTAINE, ROBIN, CHAUMETON, MOUION, and numerous others have shown, that it is not a product of neglect or dirt, otherwise it would have been seen in other countries as well as in Poland; that the bulbs of the hair exude a peculiar viscid secretion which may be seen issuing from them when the morbid hair is removed; that they are found swollen and acutely sensible; that it is often attended by a similar change in the nails; that it is frequently a marked crisis of other maladies; and that it cannot be quickly removed without danger. Much of the difference of opinion as to the origin and nature of plica, and as to the consequence of removing it, has arisen from confounding the false (§ 12.) with the true disease.

42. iii. DIAGNOSIS. — The precursory and characteristic symptoms are such as readily distinguish true plica, from the false or the feeling of the hair caused by neglect of cleanliness, &c. and from every other affection. The agglutination of the hair by a nauseous exudation from its roots, the enlargements of the bulbs, the swelling and softening of the hair itself, and the attendant alteration of the nails, are peculiar to this complaint.

43. iv. TREATMENT. — The occurrence of plica in persons affected with various serious diseases has sometimes proved beneficial. In such cases

it should not be interfered with, until the agglutinated mass is pushed at some distance from the skin by the growth of healthy hair. When plica is left to itself, the febrile and other symptoms very frequently disappear of themselves. After several months, or a year, or even longer, the morbid exudation decreases or entirely ceases; and as an effect of the growth of hair, the diseased portion is removed to a distance from the surface. It is only then that the Polish physicians recommend the hair to be cut. SCHLEGEL, LA FONTAINE, HARTMANN, MOUTON, and other experienced writers contend that the removal of the diseased hair before this time has been followed by amaurosis, palsy, convulsions, epilepsy, apoplexy, and even by death.* Warned by these consequences, and considering the exudation from the scalp and pilous bulbs as a poison—"virus trichomaticus"—the expulsion of which from the system is essential to recovery, the Polish physicians frequently carry the principle of non-interference to an injurious length. At the same time, it must be admitted that a premature removal of the diseased hair and suppression of the morbid exudation is very likely to prove injurious upon the principles stated above, and insisted upon in various parts of this work; especially if such interference be not attended, and its consequences not prevented, by the exhibition of means which will eliminate effete or morbid matters from the circulation, by increasing the functions of other emunctories, particularly of the intestinal canal, kidneys, and skin. If, therefore, the hair become dry and sound at its roots, the best informed observers agree in removing it, the head being kept moderately warm afterwards; but, as long as the bulbs continue inflamed, morbidly sensible, and exude a viscid fluid, other means of cure should be prescribed. What these means, however, are, is a matter that has not yet been fully shown; and certainly the internal remedies recommended by most of the writers on plica are but little calculated to remove the morbid conditions on which it depends.

44. The marked disorder of the digestive and excretory organs, acknowledged to attend or precede the appearance of plica, although never viewed in sufficiently close connection with its causation, indicates the propriety of directing at least a part of the means of cure to these organs. The antecedent pica, and the morbid states of all the secretions and excretions, show the propriety of having recourse to purgatives—cholagogue, deobstruent, stomachic, and others,* according to circumstances—in the treatment. It is to the general neglect, in Poland especially, of these and of other evacuations, in the early stages of acute and chronic maladies, that the occurrence of this affection is, in my opinion, chiefly to be attributed. That purgatives are of service in plica is shown by the admission of the good effects resulting from them, by HUFELAND, DE LA FONTAINE, and KÜSTER. From the manner in which the means of cure have been recommended in works on plica, it is very obvious that most of them are employed altogether empirically. The *Lycopodium clavatum* is much used both externally and internally, but some writers consider it inert. Various preparations of mercury, antimony, sulphur, zinc, &c., have been employed; and emetics, diaphoretics, anodynes, narcotics,

have severally been insisted upon. It is obvious that these may be either serviceable or injurious according to the circumstances of the case, and the manner of prescribing them. DE LA FONTAINE and KÜSTER prefer sulphur and antimony, and their combinations, especially the golden sulphuret of antimony. J. FRANK praises sulphur and conium. For the debilitated and aged, it is obvious that tonics, or a combination of tonics and aperients, are necessary. Personal cleanliness, warm baths, and suitable diet, are also requisite.

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HEADACH. — SYN. κεφαλαλγία (from κεφαλή, the head, and ἀλγία, I suffer pain); κεφαλαία, ημικρανία, (from ἡμι, half, and κρανιον, the skull). Cephalalgia, Cephalæa, Hemicrania, Auct. Lat. var. Dolor Capitis, Sennert, &c. Dolor Cephalicus, Hoffmann. Capilepinum, Baglivi. Gravedo Capitis, Carebaria, Καρβαρία (from καρ, the head, and βαρυς, heavy), Podagra capitis, Clavus, Clavus Hystericus. Mal de Tête, Cephalalgie, Migraine, Fr. Kopfschmerz, Hauptwehe, Germ. Mal

di Capo, Cefalea, Ital. Pain in the Head, Migrim.

CLASSIF.—4. Class, 4. Order (Good).

IV. CLASS, III. ORDER (Author).

1. DEFIN.—*Pain in the head, with intolerance of sound, sometimes also of light, and incapability of mental exertion.*

2. Headach has too geneferally been referred to disorders of those viscera of the abdomen with which the head sympathises, even when manifestly proceeding from morbid states of parts enclosed by the cranial bones. It should, however, be recollected that the primary affections of which headach has been viewed as a symptom merely, much more frequently exist without, than with, this attendant; and that, when thus accompanied, some pre-existent or contemporaneous affection of the head is often actually present, either independently, or as an intimately related complication, of these reputed primary disorders, and is only aggravated or rendered more manifest by them. Besides—and the circumstance cannot be too strongly impressed upon the young practitioner—those very disorders so generally considered the source of headach are not infrequently produced by an affection of the brain; for, pain of the head, although a common symptom of it, is neither universally nor constantly present, but is very frequently altogether wanting at an early or an advanced period; so that disease of the brain itself may in the first place disorder the digestive or other functions, this disorder reacting upon the brain, or on the nerves more immediately related to it, and exciting or otherwise altering their sensibility, so as to give rise to headach and other symptoms actually depending upon the brain, although developed and rendered manifest by the sympathetic disturbance of the digestive organs. When this takes place, the means of cure directed to the supposed primary disorder, but really to the symptomatic affection, by removing it, and by modifying the current of the circulation, frequently relieves the disease of the brain as far as morbid sensibility is concerned, and the relief is more or less complete or permanent, according as the prescribed treatment affects both the symptomatic and the primary disorder. That secondary or sympathetic disorders are often thus mistaken for the primary is manifest to every experienced and acute physician upon reading Dr. WARREN's paper on headachs; for many of the symptoms he has enumerated, as indicative of primary disorder of the stomach and intestines, are often either dependant upon the state of the circulation within the head, or associated with an affection of this part, and are resulting phenomena of previous disorder of the organic nervous system.

3. The dependence of disorder of the digestive organs and of the altered sensibility of the head upon the state of organic nervous influence has been overlooked by pathologists, owing to the brain having been generally, but erroneously, viewed as the source of nervous and vital energy, and to the dominion which the stomach has been supposed to exercise over the functions of other organs, through the medium of the brain. But it has been shown in another place (see art. DEBILITY, DISEASE, &c.), that the brain performs other offices than that of generating organic, nervous, or vital power; that it is enabled to perform its appro-

priate offices by the vital influence it derives from the organic nervous system; and that the stomach is dependent upon the same source as the brain for the discharge of its functions. Instead, therefore, of considering headach to proceed so frequently from disorder of the digestive organs as some recent writers suppose, I view both the one affection and the other as often associated phenomena resulting from other morbid conditions; and whilst I grant that it sometimes arises from that source, I contend that it then appears as a contingent phenomenon only, for when one part of the circle of organic nervous influence is disturbed, other parts frequently become also disordered, as hereditary constitution, previous disease, latent vice, or habits of life, may have predisposed particular organs or structures. Moreover, it seems extremely probable, that various morbid states of parts contained within the cranium are indicated by pain, before they have proceeded so far as to induce change of structure, or even without occasioning this result. The existence of altered sensibility of the ganglial nerves distributed to the head may be admitted, without any very evident alteration of the parts they supply being thereby induced. Observation has proved that the degree of pain is no index to the danger or extent of disease, as the most severe headachs are often unattended by any other evidence of organic lesion; whilst the most extensive disorganisation is frequently accompanied by little or no headach.

4. From this it will appear, that headach should be viewed as a symptom of disorder within the cranium, although not of altered structure, more frequently than it usually is; that it should be oftener assigned to a change in the organic nervous energy and sensibility in this situation; and, consequently, that it is oftener a primary disorder, than it has been generally considered. In treating, therefore, of headachs, I shall view them with strict reference to pathological states. Some of these states are such as do not admit of the headachs they produce being viewed otherwise than as symptoms; but others allow a nearer approach to a primary or idiopathic form, especially where local or general causes of exhaustion or depression occasion the complaint.

5. When called to a person suffering, or liable to, severe headach, the rational practitioner is led to inquire as to the causes and seat of pain, and as to its nature. But these are amongst the most difficult points to determine in practical medicine. The causes are most numerous and diversified; and yet they have a more or less intimate relation to the kind or form of the pain that results. The seat of pain is determined with great difficulty even when it admits of recognition, and, in many cases, it is impossible to ascertain it with any degree of precision. In order to arrive at a just conclusion, a number of circumstances—the history of the case with its causes and progress, the existing symptoms, and more especially those which more directly relate to the functions of digestion and excretion, and to perception, sensation, and locomotion, must be carefully observed and cautiously estimated. When the external or superficial parts of the head are chiefly affected, the exact seat and nature of the disorder are sometimes manifest.

But even in this case, the external affection may be only the consequence of previous disease of internal parts, the exact nature or seat of which can be only surmised in many instances. Disease of the membranes is generally attended by pain; but when it is chronic, and even when acute, if pressure of the brain is caused by it, no headach may be felt. When the more internal parts, especially the fibrous or medullary structure, are altered, pain is only an occasional symptom. Indeed, whenever the substance of the brain is chiefly affected, the pain should be ascribed rather to those parts of the membranes, or of the ganglial nerves supplying the brain, that had become implicated in the disease, than to the brain itself. Although it is the brain that feels alteration of sensibility induced in morbid parts, yet its own sensibility is so obscure, or so deficient, as seldom to be either excited or perverted when itself is the seat of lesion. Besides this, when the disease of the brain is attended by pain, the pain is rarely referred to the internal parts of the head, but either to some superficial situation, or to the head generally, in a confused or indistinct manner; or to some more or less distant part having an intimate nervous connection with the seat of disease.

6. The difficulty of ascertaining the nature of headach cannot be considered so great as that of determining the seat of it. Indeed it is often from inferences as to the nature of headach, that we are enabled to form any notion of its seat. A careful inquiry into the causes of the pain in every case, and a due estimate of the constitution, habits of life, previous ailments, and existing state of the patient, will generally enable the physician to determine as to which of the different forms of the complaint, into which I have divided it, individual cases belong. The kind of pain especially should be inquired into with the utmost precision. Its severity, its character, the state of the senses, and of the general sensibility, the temperature of the scalp, &c. ought to be ascertained. The pain may be either slight or intense, or characterised as heavy, dull, indistinct, diffused, numbing, compressive, constrictive, tensive, acute, burning, rending or bursting, or splitting, darting, lancing, plunging, cutting, tearing, gnawing, boring, pulsating, or throbbing, &c.; but whichever of these may exist, the mode of its accession and subsidence; its duration, remissions, and exacerbations; the circumstances alleviating or aggravating it, the extent and situation of it, and its connection with affections of sight — with noises in the ears — the character of these noises — and with derangements of sensation, touch, and muscular action, in any part of the body — ought to be carefully remarked. The state of the mental operations, of the articulation, and of sleep in respect both to its manner and duration, should also receive attention. It is only from a careful estimate of these circumstances — of all the functions depending upon the cerebro-spinal system in connection with the state of the digestive, excreting, and circulating functions — that a correct opinion as to the nature of headach can be formed. There is no disorder which tries the science, experience, powers of observation, and acumen of the physician, more than this does, and there is none that requires a more precise

estimate of the pathological conditions on which it depends, as a basis for safe and successful indications of cure. From this it will appear, that a comprehensive division of the varieties of headach, without being either complicated or unnecessarily minute, is requisite to the due consideration of so important a subject as this.

7. SAUVAGES divides headach into three species: — *Cephalalgia*, or acute headach; *Cephalæa*, or chronic headach; and *Hemicrania*, or partial or local headach. Under the first he enumerates the following varieties: the *plethoric*, *catamenial*, *hæmorrhoidal*, *dyspeptic*, *febrile*, *throbbing*, *intermittent*, *puerperal*, *inflammatory*, *catarrhal*, *nervous*, *hysterical*, and the *metallic*. Under the second species, he adds the *syphilitic*, *scrofulous*, *arthritic*, *remittent*, *melancholic*, the *Polish*, or *plaque*, and the *serous*. Under the third, pains of the eyes and sockets, in the frontal sinuses, and the *catarrhal* and *hysterical*, *hæmorrhoidal*, *purulent*, *nephralgic*, and the *lunatic hemicrania*. It is obvious that this enumeration is deserving of attention, only in as far as it shows the symptomatic states of the disease. SAUVAGES adopts the division of SAUVAGES without any material alteration. J. FRANK also follows it partially, and enumerates four species, viz. *Cephalalgia*, *Cephalæa*, *Hemicrania*, and *Clayus*. He considers that headachs, in respect of their nature, may be further divided into *inflammatory*, *rheumatic*, *gastric*, *arthritic*, *scrofulous*, *periodic*, *scrofulous*, *carcinomatous*, *syphilitic*, and *nervous*.

8. Dr. GOOD has taken a very superficial view of the pathology of headach, and the surgical Editor of his work has added nothing to the text. He divides headachs into the *stupid*, *chronic*, *throbbing*, and the *sick*, and *hæmic*. Every practitioner of experience must have met with, if he have not actually experienced in his own person, headachs which at one and the same time possessed all the characters Dr. GOOD has enumerated as marking distinct species. Dr. HUNTER has given a more correct division of the complaint, but it is deficient in some important particulars. The varieties according to him are — *muscular*, *osteal*, *congestive*, *organic*, *dyspeptic*, and *pericranial* headach. Dr. WEATHERHEAD divides headachs into *dyspeptic*, *nervous*, *plethoric*, *rheumatic*, *arthritic*, and *organic*. The division adopted by SAUVAGES is complicated, and, notwithstanding its apparent minuteness, deficient. The arrangements of recent writers are even still more defective.

9. The several varieties of headach will be more advantageously considered according to the following arrangement: — 1st, The *nervous* — from depression or exhaustion; — 2d, The *congestive*, from impeded circulation in the brain or its membranes; — 3d, The *plethoric* and *inflammatory*, from general plethora, active determination of blood to the head, or inflammatory action; — 4th, The *dyspeptic* and *bilious*, from disorder of the stomach, liver, or bowels; — 5th, The *cerebral*, from organic change within the cranium; — 6th, The *pericranial*, from disease of the pericranium, or bones of the cranium; — 7th, The *hæmicranial* or *limited*, confined to a spot, or neuralgic; — 8th, The *rheumatic* and *arthritic*; — 9th, The *periodic*; — 10th, The *hypochondriacal*; — and, 11th, The

sympathetic, from disorder of the uterine and urinary organs.

10. i. **NERVOUS HEADACH.**—*A. Causes.*

—*a.* This variety is mostly frequent in females, in persons of the nervous temperament, and in those possessing high susceptibility, and delicate constitutions. General excesses, masturbation, intestinal worms, the abuse of calomel or other mercurials, and whatever depresses or exhausts nervous or vital energy, predispose to it. —*b.* It is often excited by exposure to cold, or to cold and humidity conjoined; by northerly or easterly winds; by the more extreme electrical states of the air, or by sudden vicissitudes of these states; by prolonged or excessive lactation; by losses of blood, menorrhagia, leucorrhœa, or other discharges; by low diet and prolonged fasting; by depressing passions, alarm, fear, grief, and anxiety of mind; by want of sleep, or inordinate mental or physical exertion; by the improper use of mercury or other depressants, as tobacco, digitalis, &c.; by various odours or mephitic vapours or gases; and by the impure air of crowded or insufficiently ventilated rooms. Sleeping in apartments containing plants in flower, the fumes of burning charcoal, or of turpentine, and recently painted rooms not infrequently cause it. The irritation of adjoining parts, as caries of the teeth and disease of their fangs sometimes also occasion it, especially on the same side of the head is the seat of irritation. I have seen the most intense state of this affection produced by the injudicious application of cold to the head, by too copious depletion, by floodings, and by a residence in low, cold, and humid localities. Nervous headach is common to females during the catamenia, especially when excessive or too frequent. It is often, also indirectly caused by intoxicating liquors. HEINMANN very justly notices it, as a not infrequent attendant upon general anæmia, resulting from disease or improper treatment. I believe that some degree of cerebral anæmia very frequently attends it, if it does not produce, this variety of headach.

Nervous headach is often sudden in its attack and termination; is frequently acute, excruciating, lancinating or darting; sometimes congestive, or attended by a sensation of the temples pressed together; occasionally accompanied by vertigo, a feeling of sinking and dread of falling, or with great nervous agitation or restlessness, and sometimes confined or limited to a narrow space. The patient is incapable of thought and of physical and mental exertion. The sight is often dim or impaired; dark spots or meshes moving before the eyes. In some instances the eyes become sunk, and the countenance depressed or collapsed. The pulse is small, occasionally frequent, but generally languid, and always compressible. The pulsation of the carotids is small or weak. The head is cool, and the face more pallid than natural. The stomach is liable to disorder, especially to acidity and flatulence, and the bowels are often costive. This headach is frequently worse in the morning and through the day, and abates in the evening. During severe attacks, wakefulness, dizziness, loss of memory, general susceptibility of the nervous system, &c. are usually complained of.

12. ii. **CONGESTIVE HEADACH.**—The state of the circulation within the head; the manner in which

the blood is returned from the brain; the partial protection of the parts contained in the cranium from the physical influences exerted upon the rest of the general surface; and the periodical changes in the position of the head; and in the exercise of the functions of the brain, would seem, on a superficial view, to favour the occurrence of congestion in this part. Yet, if these circumstances be more closely contemplated, there is at least equal evidence, that they essentially tend to preserve the brain from passive congestion on the one hand, and inflammatory determination on the other, as well as from the more serious contingencies consequent upon that minute division of the extreme vessels required for the exercise of the various cerebral functions. The congestion occasioning this form of headach is seldom general, but commonly limited to, or seated chiefly in, one hemisphere or lobe of the brain, or one or more lobes, either in their vertical or basilar aspect.

13. *A. Causes.*—Congestive headach is produced by pre-existent disorder, especially by repeated attacks of nervous or dyspeptic headach, and of active determination of blood to the brain. It often follows adynamic fevers, phrenitis, congestions of the lungs, and impeded circulation through the heart; and it is not infrequently caused by the circumstances that sometimes give rise to nervous headach, particularly the depressing passions, cold and humidity, miasmata, noxious gases, mephitic vapours, and crowded rooms. The use of opium, belladonna, aconitum, and other narcotics, occasionally also produces it, especially in certain idiosyncrasies, or in large doses. Tight neckcloths, stooping, and a too low position of the head during sleep, also occasion it. The headachs following the inordinate use of intoxicating liquors are to be referred to this and the preceding variety, rather than to disorder of the digestive organs or any other pathological state. Prolonged or intense mental occupation often gives rise to congestive headach; the repeated or continued determination of blood to the brain, thereby produced, passing into congestion, owing to exhaustion of nervous power; and this state, if allowed to continue, or frequently produced, often terminates in apoplexy or palsy. This variety is most frequently observed in persons advanced in life, and in those who have exhausted their vital energies and injured their constitutions by dissipation or intemperance.

14. *B. The most characteristic symptoms of this variety are*—the dull, grievous pain, and sense of weight in the head; frequently stupor, heaviness, or giddiness; dimness of sight; buzzing, ringing, or humming noises in the ears; and heaviness or pallor of the countenance. The pain is often referred to one part of the head chiefly, probably owing to the congestion being greater in one part than in another (§ 12.). The patient experiences great increase of vertigo when looking up, or when stooping or looking down from an eminence; he sometimes complains of a sense of coldness in the head, of fatigue or prostration of strength, coldness of the extremities, and of susceptibility of the nervous system. Sleep is often sound, heavy or snoring; occasionally it is disturbed or restless, and attended by dreams, or by convulsive movements. The spirits are depressed, or almost hypochondriacal. The pulse is languid, weak, or small, occasionally accele-

rated. The bowels are torpid, and the biliary secretion deficient or morbid. The urine is loaded, and deposits a copious sediment.

15: iii. HEADACH FROM PLETHORA AND INCREASED VASCULAR DETERMINATION OR ACTION.—*A.* The predisposing causes of this variety are—the earlier and middle periods of life, the male sex, plethoric habits of body, sanguineous and irritable temperaments, full living, indolence, indulgence in bed, neglect of regular exercise in the open air, and mental exertion.—*B.* The exciting causes are—all the circumstances which either increase the vascular plethora resulting from the predisposing causes, or determine an increased flow of blood towards the head, especially, neglect of accustomed depletions; the suppression of discharges and eruptions, particularly of epistaxis, the catamenia, and hæmorrhoids; exposure to the sun; intemperance in eating or drinking; premature or inordinate mental culture, and exercise of the intellectual powers; every kind of mental excitement, fits of passion; the supine posture with the head low; wearing strait corsets; too long hair, or the removal of it; overheated or overcrowded rooms or assemblies; prolonged or unaccustomed continence, and the causes usually occasioning inflammation of the brain or of its membranes, or determination of blood to these parts. (See art. BRAIN, § 182.)

16. *C.* The Symptoms in this variety sufficiently indicate the cause of the headach; but they differ very much in different habits, temperaments, and ages.—*a.* In young persons, the pulse is strong, or full, somewhat accelerated; the head is hot, the countenance flushed, the eyes more or less suffused and heavy; and the pain is rending, severe, sometimes pulsative or throbbing, occasionally with a beating noise in the ears, and felt chiefly in the forehead and temples. The bowels are costive; and the patient is depressed, heavy and indisposed to exertion. *b.* In delicate or young persons, whose mental faculties have been prematurely exercised, or exerted to the neglect of the physical powers, the slightest excitement and the most trifling causes will produce headach, with coldness of the extremities, and great susceptibility of the nervous system, especially of females. The principal flux of the circulation takes place to the head, and the functions of other parts are performed imperfectly.—*c.* In persons of the middle age, or beyond it, and especially in those who have lived fully or intemperately, the headach is heavy, rending, or throbbing; often general, or referred chiefly to the occiput; attended with increased heat of the scalp, with distension of the veins about the temples, with fullness or redness of the eyes, and sometimes also of the whole countenance. The face is occasionally bloated, and its expression heavy; the pulse is full, strong, and oppressed, or slower than the usual standard; the bowels are torpid, the liver inactive, and the urine high-coloured or loaded. Sleep is heavy, but often disturbed. In some cases, however, with all, or nearly all, these symptoms, the patient is excited, or restless, is watchful, or sleeps but little, or is irritable, and the pulse is slightly accelerated; the excretions being scanty. In the first and second classes of persons, this form of headach not infrequently precedes inflammation of the brain and membranes, or effusion from the latter: in the third

class, it more frequently ushers in apoplexy or palsy.

17. iv. DYSPÉPTIC AND BILIOUS HEADACHS.—*A.* This variety of headach is very nearly allied to the nervous and congestive, and it has been confounded with these in the description of it given by Dr. WARREN. From the circumstance of sickness or vomiting being a frequent symptom, the term *sick headach* has been commonly applied to it. But I am convinced that this symptom often depends upon the brain, and that many cases, which have been viewed as merely instances of sick headach, have actually been cases in which the affection of the brain had been attended both by sickness and by headach (§ 2. *et seq.*). This form of disorder frequently affects dyspeptic persons who have been longer than usual without food, or who have committed even slight errors of diet, and whose bowels are habitually sluggish. It may occur, as Dr. BUNNELL remarks, without any obvious susceptibility of the brain; or in persons who can bear close application to study without inconvenience as respects the head, and yet who are liable to headach after taking certain articles of food, or mingling them in too great variety.

18. Dyspeptic headach, particularly when attended by nausea or vomiting, is observed chiefly in persons subject to mental or cerebral excitement, and in whom the gastric disorder, as well as the pain of the head, are only effects of that excitement. In these, the stomach is either irritable, or weak, or even both, and unfit to perform its functions, as well as very liable to become further disordered by slight causes. Stomach headach generally affects the forehead on one temple, particularly the left; but it often extends over most of the head. When the left temple is chiefly affected, tenderness of the left eye is frequently also felt. The pain is dull, heavy, or oppressive, or acute, sharp, or darting. The mental faculties are somewhat weakened, and exertion of the mind is irksome. Tenderness of the scalp is seldom present, unless in a slight degree, or in connection with rheumatism. This variety of headach usually compences with the patient first wakes. It is then oppressive, heavy or diffused. Nausea often supervenes, and sometimes vomiting. When the pain is slight, it generally subsides after breakfast; but if retched, it continues longer, or until offending matters are thrown off, and then becomes more limited or concentrated. The remains of an undigested meal, or merely an insipid fluid, mixed with frothy mucus, is at first ejected. But if the vomiting continue, bile is frequently discharged. In some instances, an acid or acrid fluid, or greenish bile, is vomited, when pain and all the symptoms disappear. If the attack be not arrested by suitable means, or by the spontaneous vomiting, the pain often increases as the day advances, until stimulating food or beverages taken into the stomach, or sleep, allays it; but it may return the following day. Dyspeptic headach, however, may take place much more slightly and transiently; or it may assume a more chronic or continued form. It may follow a principal meal, and cease in two or three hours; or it may not occur until several hours after a meal. The pulse is languid or feeble, seldom accelerated. The tongue is white, loaded, particularly towards the root;

and its edges are slightly red, and often indented by the teeth. The bowels are usually costive. Vision is frequently indistinct; and coldness or slight numbness of the fingers is sometimes complained of.

19. *b.* It has been supposed by Dr. WARREN and Dr. PARIS, that, when the headach does not occur until several hours after a meal, and particularly when uneasiness or a sense of distension is felt in the situation of the duodenum, it depends upon irritation of this viscus. The circumstance of an emetic often failing to afford relief in such cases, or to evacuate any thing material from the stomach, whilst a dose of rhubarb and magnesia, or of any other purgative, generally removes both the headach, and the uneasiness in the course of the duodenum, has been considered as proof of the dependence of the affection of the head upon disorder of this bowel. Without questioning the existence of functional disorder of the duodenum in these cases, the origin of the headach in that disorder does not necessarily follow. Both affections, most probably, depend upon the same pathological states; and it is, moreover, extremely likely that the derangement of the duodenum extends more or less to both the stomach and liver. The symptoms which the writers just referred to consider characteristic of headach proceeding from disorder of the upper portion of the intestines, — particularly chilliness of the body, coldness and dampness of the hands and feet; severe pain of the head, with a sense of coldness and tightness of the scalp; slight giddiness, with weight, distension, and stiffness of the eyeballs, and the appearance of brilliant ocular spectra; and sometimes tingling and numbness of the fingers and hands, — arise as much from disorder of the stomach or liver, or both, as from derangement of the duodenum and upper parts of the intestines. More dependence may, perhaps, be placed upon flatulency and the sensation of dryness and inactivity of the bowels noticed by Dr. PARIS, and upon the presence of nausea without vomiting; but it is most probable that the sensibility referred to the head, equally with the symptoms just mentioned, depends primarily upon the state of organic nervous influence.

20. *B.* Biliary derangement is generally connected with more or less disorder of the stomach and bowels: the affection of the one may have extended to the other; or all may have been simultaneously disturbed by causes affecting the nervous or the vascular systems. In either case, the disturbance is not infrequently also extended to the head, and partly manifested by pain in this situation, particularly in the forehead, eyebrows, and orbits. — *a.* The headach may proceed from an interrupted discharge of bile into the duodenum, and a consequent accumulation of it in the gall-bladder or hepatic ducts; the morbid impression thereby made upon the organic nervous system affecting the head, and often, also, other remote parts. When the headach arises from this state of disorder, vascular action is generally weak, languid, or depressed, the tongue loaded or white, the skin harsh or unhealthy in its hue, and the functions of digestion and secretion impaired. In these cases, flatulency, coldness of the extremities, and a sense of smarting in the eyes and eyelids, or pain in the eyeballs, are often, also, complained of.

21. *b.* In some instances, headach proceeds from an exuberant secretion of bile, or from the irruption of morbid bile into the duodenum; but, in most of these, there are increased vascular action and heat of skin, with nausea and bilious vomitings. The face is flushed, the eyes suffused, and the pain is throbbing or rending. The evacuation of bile often gives relief; but the retchings sometimes keep up the secretion, or promote the discharge of it; and the digestive mucous surface, and the nerves supplying it, being thereby irritated, vascular action becomes excited, and the sensibility even of remote parts more or less altered: pains of the head, loins, and limbs are thus induced.

22. *C.* The Causes of dyspeptic and bilious headach have a very intimate relation to the predisposition or susceptibility of the nervous systems and digestive organs to excitation or irritation. — *a.* Such susceptibility very often exists in a high degree in persons of sedentary and studious habits. Intense application of the mind, the anxieties of parents, the eager pursuit of business or of gain, the speculations of merchants, the gambling transactions of the stock markets and of club-rooms, &c., keep the mind in an almost constant state of excitement, determine an augmented flow of blood to the brain, and thereby increase the irritability of the stomach, and predispose both organs to be disordered by the slighter causes to which the latter is so much exposed. As vital power becomes weakened, the susceptibility of the cerebro-spinal nervous system is increased, and the sensibility of it more readily disturbed. The digestive and assimilative functions are also weakened, and more prone to disorder, which not infrequently affects the brain, especially when its circulation has been excited, or kept in an almost constant state of erethism, by the circumstances just adverted to. Dyspeptic headach is most common in the young or middle aged. The bilious variety is most prevalent during summer and autumn.

23. *b.* The exciting causes are — errors in diet, especially too great a variety or quantity of food; indigestible, acrid, cloying, rich, or heavy articles; too long fasting; or the excessive use of diluents or of stimulating or intoxicating beverages, particularly of spirituous liquors; costiveness or constipation, and the irritation of morbid secretions and fecal matters retained in the bowels. In young persons, especially, headach and increased determination of blood to the head are frequent consequences of costiveness, or collections of sordes or of fecal matters in the digestive canal, and of intestinal worms.

24. *V.* HEADACH FROM ORGANIC CHANGES. —

In the early stages, this form of headach can hardly be distinguished from the other varieties; indeed, organic change not infrequently originates in some one of the pathological states of which headach is an occasional attendant. But, whilst in all these varieties the pain is only sometimes present, or is, at least, entirely absent for considerable periods, that produced by organic lesion is nearly constant or continued, or merely remits, without altogether disappearing. The alterations which are attended by headach are numerous; indeed, all those enumerated in the articles BRAIN (§ 3—133.), and CRANIUM, may give rise to it; but the most common are tumours of various kinds, hydatids,

prosthesis from the inner surface of the cranium, ossific formations, softening of the substance of the brain, suppuration, adhesions of the membranes; tubercular, cancerous, fungous, and malignant productions, &c. Besides these, aneurismal or ossified arteries, varicose or inflamed veins, obstructions in the sinuses and veins; concretions, albuminous exudations, or purulent matters in these vessels (LIEUTAUD, BOSSINI); enlargement of the pineal or pituitary glands, serous effusion, &c., have been observed.

25. The pain caused by any of these lesions is generally fixed, often referred to the same spot, continued, and deep seated. It is independent of the other causes of headach, although aggravated by them, by mental application, by stooping, and by stimulants. Dr. BURDER justly remarks, that cheerful conversation, that would chase away, or at least suspend, the feeling of ordinary headach, often becomes insupportable in this variety. When the disease is farther advanced, even a slight motion of the head, or rotating it, often gives rise to extreme suffering, and sometimes to vomiting. The affection of the stomach dependent upon the cephalic lesion frequently occurs without any obvious cause, or independently of apparent disorder of the stomach itself, or of any error in diet; and the pain of the head remains when the sickness ceases. Although the pain is generally constant, yet remissions are sometimes felt, or even short intermissions, especially early in the disease. This is even the case when the lesion is malignant or carcinomatous, or consists of fungous tumours; and the pain is usually then lancinating, stounding, or darting, and referred to a particular spot. In the advanced stage of organic headach, spasmodic contractions of the limbs, vertigo, convulsions, paralysis, or idiotism, frequently supervene. When the lesion is of a malignant or contaminating nature, the surface generally assumes a pale straw-coloured hue, or is obviously cachectic. Neuralgic pains in the face, or in more remote parts, darting pains in the limbs, are also occasionally present in this variety. (See arts. BRAIN—Softening of, &c., and PALSY.)

26. vi. HEADACH FROM DISEASE OF THE PERIOSTEUM AND CRANIAL BONES.—This variety is not often met with. Cases of it have been recorded by Mr. CRAMPTON, Sir E. HOME, Dr. ABERCROMBIE, and others; but the best description of it is given by Dr. BURDER.—a. Affection of the *periosteum* is usually caused by exposure to cold, to currents of air, to humidity, and vicissitudes of temperature and weather. The pain is tensile, remitting, and increased by pressure, and by the action of the temporal or occipito-frontalis muscles. There are sometimes fever and excited action of the vessels of the head, with increase of the heat of the scalp. A constrictive pain is caused or aggravated by going into a cold room, or by removing the usual covering from the head. Dr. BUADEN observes, that this variety of headach occurs only in those who have suffered from continued cerebral excitement; and that it is commonly dependent upon a highly susceptible, or preternaturally vascular, condition of the brain or its membranes, such as is often induced by long-continued study, by mental irritation, or by gastric or hepatic disorder, connected with de-

bility or exhaustion. If a person, whose nervous or vital powers are thus impaired, and whose brain and membranes are rendered susceptible and vascular, is exposed to the exciting causes just mentioned, periosteal cephalalgia of great severity or obstinacy is often produced; the external affection, with the consequent irritation and want of sleep, aggravating the morbid condition of the brain and membranes. The cases which I have seen have been chiefly in persons of the scrofulous diathesis.

27. Cases of fixed pain of the head, and tenderness of a portion of the scalp, with thickening or swelling of the integuments, have been observed by the writers just mentioned, and by Mr. FARSON and Sir C. B. BRODIE. I have seen instances of this affection originate in *otitis*: one of these was in a medical friend, who consulted also Dr. J. JOHNSON and Sir C. B. BRODIE. The external disorder followed the use of the cold douche, or shower bath, recommended for the removal of increased vascular action and heat of the scalp indicative of cerebral excitement.—Division of the pericranium in these cases has generally shown thickening of the periosteum; and even disease of the bone in a few instances.

28. When headach is owing to a diseased state of the bones (see art. CRANIUM), there are constant pain and tenderness of a particular spot. Some of these cases originate in syphilitic or mercurial cachexia. Others proceed from inflammation of the ear, and are connected with chronic discharges from this organ, or consist of caries of a portion of the petrous bone, or of the mastoid process. In the cases of this kind which I have seen, there was partial paralysis of the face, with excessive swelling around the ear, especially below it, and extending even to the eye. I attended one of these cases with Mr. BARNWELL; and another was seen by Sir C. BELL and myself, and is noticed in his work on the nervous system. Similar instances are recorded also by FRANK and others.

29. vii. RHEUMATIC AND ARTHRITIC HEADACH.—A. Rheumatic Headach is usually caused by exposure to cold, or to cold and humidity, or to currents of air; by uncovering the head while perspiring; by sleeping on a damp pillow; by the passage of air through a carriage window; by sudden vicissitudes of temperature or of weather, especially by easterly or northerly winds. But a *predisposition* arising out of the rheumatic diathesis, or of disorder of the digestive organs—particularly torpor of the liver, accumulations of bile in the bile passages, and collections of *sordes* in the intestinal canal—is often necessary to the production of this affection of the head.

30. Rheumatic headach is often preceded by a sense of coldness over the head and face, especially on one side. It is seated chiefly in the aponeurosis of the occipito-frontalis and temporal muscles; but it is not always confined to this structure, it being sometimes associated with increased vascular determination to the membranes of the brain. The pain is severe, heavy, distracting, or aching, and in its uncomplicated state is attended by a sense of coldness, by great tenderness of the scalp, by rheumatic pains extending down the neck, or in one side of the neck, or in one shoulder, or in the face; sometimes by copious perspirations; and more rarely by rheu-

matic inflammation of one or both eyes. It is generally aggravated in the evening, and alleviated in the morning, and by warmth. There is no increase of the temperature of the scalp, or augmented action of the arteries of the head, unless the affection be complicated with excited vascular action in the internal membranes. If it be thus complicated, these symptoms are also present; and, as Dr. ELLIOTSON justly observes, there are likewise giddiness, drowsiness, and internal throbbings. This associated disorder is seldom ameliorated by warmth; and the face is often flushed, the eyes injected, and the vessels loaded.

31. *B. Arthritic Headach* is met with in persons who are subject to the irregular forms of gout; and, in those who have an hereditary or an acquired predisposition to this malady, it may be the first manifestation of the gouty affection. Of this I have seen more than one instance, both in males, and in females about the change of life. It is not an unusual form of misplaced or of retrocedent gout, in persons who have had the disease in its more regular forms, but who neglect the air, exercise, and regimen necessary to the development of a regular paroxysm; and it is often a dangerous affection. The pain is severe, and attended by a sense of fullness and of heat or burning in the head; by remarkable tenderness, and by increased heat of the scalp; by giddiness, dimness of sight, and fear of approaching insensibility, especially upon stooping; by sounds in the ears, great acuteness of hearing, and intolerance of noises; by flushes of heat in the face; by irritability of temper and restlessness; and by confusion of thought and loss of memory. There are also flatulence and disordered digestion; costiveness; a morbid state of the stools, and of the biliary secretion; and scanty high-coloured urine, which deposits a copious reddish sediment. The tongue is generally loaded, and its papillae excited; and the pulse is either natural, as to frequency, and full, or accelerated and hard, or opposite. If this affection is not removed, it passes into effusion, with comatose or apoplectic symptoms. (See GOUT—*Irregular Forms*, § 16.)

32. viii. *INTERMITTENT HEADACH—Cephalgia Periodica*, Auctorum—*Febris Intermitteas Cephalica larvata*, J. FRANK—usually presents the same characters as the functional varieties already described, especially the nervous and dyspeptic, and differs from them only in respect of periodicity. But it may be not merely functional; for the pain caused by chronic inflammation of the membranes, or even by organic lesion within the cranium, may assume, at their early stages, an intermittent type. A strict investigation of the causes, and of the states of the various functions, is therefore requisite to a knowledge of the nature of the affection. When the headach proceeds from terrestrial exhalations, or from cold, raw, easterly or northerly winds, and attacks persons who have been affected with agues or remittent fevers, it generally returns daily, either in the morning or about noon; but it may observe a tertian or quartan form. It is often limited to a particular part of the head,—frequently to the forehead, or to one brow, or to the brow and orbit—brow-ague. It is sometimes seated in one half of the head. The pain is occasionally so severe and so limited in extent, as closely to re-

semble neuralgia. Indeed, intermittent headach and neuralgic affections almost insensibly pass into each other; the paroxysms of the latter being, however, much more intense and of shorter duration than those of the latter; and they both frequently proceed from the same predisposing and exciting causes, namely, disorder of the stomach, bowels, and biliary organs, and exposure to malaria, or to cold damp winds, &c.

33. ix. *HYSTERICAL AND SYMPATHETIC HEADACH*.—The pain in the head is one of the numerous forms in which hysteria manifests itself. It is generally limited to a small space, or to a single spot; and is often described as resembling a wedge or nail driven into the cranium or pressing upon the brain—*Clavus*, &c. It is commonly sympathetic of irritation of the uterine organs, and associated with irregularity of the uterine discharge—with painful, scanty, or excessive menstruation, or with leucorrhœa; and with flatulent hystericisms, or with the globus hystericus. I have seen it also connected with worms in the intestines, with the irritation of calculi in the kidneys, and with tenderness, and other indications of inflammatory irritation, of parts of the spinal chord and membranes.—Indeed, affections of the spine seldom exist without pain in the head, in some one of its forms, being occasionally felt.

34. x. *HYPOCHONDRIACAL HEADACH*.—Pain of the head is often one of the most distressing symptoms of which hypochondriacal and melancholic persons complain, and is exaggerated by them into the most intense suffering that can be imagined; and yet, when their attention is directed to other objects of interest, or when they are otherwise excited, this part of their miseries seems altogether forgotten, or for the time removed. Their minds brood upon the cause and consequences of the pains referred to this situation, until they firmly believe the very worst results. A patient, some time since, called upon me to know whether or not I considered the pain to depend upon organic change; and, although my opinion was that this was not the source of the affection, yet several visits were afterwards made to me with the same object. Another more recently came under my care, with the firm belief that the headach would terminate in insanity or idiotism. Such cases are, however, not rare; and although the fears, which subsequently become the firm convictions, of the patient, are fulfilled in some instances, or even impel them to suicide in others, yet recovery is not infrequently effected by judicious treatment and management. The source and character of the pain in such cases are ascertained with difficulty, as the patients' accounts are often exaggerated; but are most frequently dependant, as far as I have observed, upon the state of the nervous system, in connection with chronic disorder of the digestive canal and biliary organs. The organic nervous energy is manifestly impaired, and all the functions which chiefly depend upon it. But I have seen cases furnishing evidence of congestion, or of chronic inflammatory action, of the brain or of its membranes, and have found a treatment based on this view more or less beneficial.

35. xi. *OF HEMICRANIA, AND PARTIAL AND NEURALGIC HEADACHS*.—These can scarcely be considered as distinct varieties of headach, inasmuch as the pains proceeding from the patholo-

gical states which have been passed in review are very frequently limited in extent, or confined to one side of the head, or affect it chiefly. This is especially the case with the dyspeptic, the bilious, the organic, the nervous, the rheumatic, the intermittent, and the hysterical varieties; and it is still more so in respect of that, upon which a few observations remain to be made—the *neuralgic*. — *A*. This variety is characterised principally by the intensity of the pain, which is confined to a single spot, or extends in the course of a single nerve. The pain comes on in violent paroxysms, is of short duration, and is followed by distinct, and often by considerable, intermissions. There is generally increased sensibility or tenderness of the scalp around the seat of suffering; and the digestive organs often betray disorder. The nervous system is susceptible and weakened. The pulse is seldom materially disturbed. This is only one of the numerous situations in which NEURALGIC AFFECTIONS (see the article) manifest themselves.

36. *B. Partial or limited Headach* is often excited by local causes of irritation. — Very severe pain in the situation of the frontal sinuses has been experienced, owing to the ova of insects having passed by the nostrils to this part. Prouver gives numerous references to cases where the larvæ of insects had occasioned intense pains. A servant in my own family suffered from this cause, the larva being discharged upon a violent fit of sneezing. Caries or disease of the fangs of the teeth is often the cause of partial headach, the pain being sometimes confined to a single spot on the same side of the head as that in which the cause of irritation is seated.

37. *xii. DIAGNOSIS.* — There is no class of affections which requires greater discrimination than this; and there is, perhaps, none which is esteemed more lightly by practitioners, or more empirically treated; the digestive organs being considered much too generally as the source of disorder. I believe that a careful investigation of the cases, and close observation of the juvenia and lœdientia, will show that a greater number of them depend upon chronic inflammation of the brain, or of its membranes, than is commonly supposed. The diagnostic symptoms of each variety have been enumerated in the description of it; but the following summary may be given at this place: — (*a*) *Nervous headach* is distinguished by absence of constitutional disorder, by susceptibility of the nervous system, by the feeling of constriction, and the limited extent of the pain, by the natural temperature of the head, &c. (§ 11.). — (*b*) The *congestive* is characterised by the numb, dull or heavy, oppressive, and deep-seated pain; by languor of the circulation; by pallor or heaviness of the countenance; by dizziness, drowsiness, and want of animation; by the coolness of the scalp, and sometimes by fulness of the eyes and a bloated state of the face (§ 14.). — (*c*) *Plethoric and inflammatory headach* is manifested by the general, severe, rending and throbbing pain; by nausea or vomiting; by fulness of the vessels, or flushing of the face and eyes; by the full, hard, or oppressed pulse; and by the increased temperature of the head (§ 16.). — (*d*) The *dyspeptic and bilious* is evinced by dull, aching, or racking, or shooting pains, which move from one part to another, and

are often attended by soreness of the scalp, by disorder of the digestive organs, and flatulence; by a loaded tongue, foul breath, and a morbid state of the secretions, especially the biliary (§ 18–21.). — (*e*) The *organic* is distinguished by internal acute pain, which becomes more and more constant or prolonged; by sudden retchings; by a quick, irritable, or irregular pulse; by the pain darting or shooting from one situation; by tenderness or soreness on pressure being felt, particularly when the bones are affected; by alterations in the sensibility and motions of a limb or limbs; and by symptomatic pains, spasmodic contractions, &c. (§ 25.). — (*f*) *Rheumatic and arthritic headachs* are readily recognised from the diathesis of the patient, and from the causes and characters of these affections. The rheumatic is generally connected with rheumatism of an adjoining part (§ 30.). The arthritic presents symptoms that cannot be mistaken, especially when viewed in connection with the history of the case (§ 31.). The description of these, and of the other forms of headach, has been so fully given, that nothing further respecting their diagnosis is requisite.

38. *xiii. PROGNOSIS.* — A favourable result may be anticipated in cases of the nervous, the dyspeptic, the bilious, the rheumatic, the aguish, and the hysterical headach. A guarded opinion should be given respecting the inflammatory, the arthritic, and the rheumatic when associated with increased vascular action in the internal membranes (§ 30.). When headach is accompanied with vomiting, without obvious disorder of the stomach having preceded the attack, an inflammatory affection of the brain should be suspected; and a prognosis, conformable with this view, ought to be given. A still more unfavourable opinion should be entertained if the locomotive powers, if the memory, if the senses, or if utterance or articulation become impaired. If there be sufficient evidence of disease of the brain, or of its membranes, great danger exists, although a fatal termination may be long delayed, or even deferred for some years, as in cases of palsy. If the cranium be affected, and especially if the base of the cranium be diseased, a very guarded, not a very unfavourable, prognosis is necessary.

39. *xiv. TREATMENT.* — It is evident that indications for the cure of headachs should be inferred from the nature of each; that remedies ought to be directed to their pathological conditions and relations, ascertained by a close examination of the states of the organic and locomotive functions, of the senses, and of the mental manifestations. And, although what has been advanced above may aid the inexperienced, or furnish useful suggestions to many, yet the successful administration of remedies in these affections will entirely depend upon accuracy of observation, and upon pathological and therapeutical knowledge previously acquired. — *A Nervous Headach*, proceeding from depression or exhaustion, obviously requires the nervous energies to be restored by tonics and stimulants. These medicines, however, should be administered with due caution at first; as the more active of them, or too large doses, may excite fever or even occasion vascular determination to the head. They ought not to be given, or continued long, until fecal accumulations have been re-

moved by mild or stomachic purgatives, which should afterwards be prescribed occasionally, in conjunction with deobstruents, in order to preserve the excreting functions in a state of healthy activity. Whilst the head ought not to be kept too warm, the impression of cold must be prevented, at least until the organic functions have acquired their usual tone. In most instances, the milder tonics may be given, with the alkaline subcarbonates, or the aromatic spirit of ammonia, and with carminatives. The diet should be light and nourishing, the occasional causes avoided, and gentle exercise in the open air daily taken. In slight cases, these means, and a due regulation of the digestive functions, will remove the disorder; but, if they fail, those about to be noticed should be resorted to.

40. Nervous headach may prove obstinate, or it may be unusually violent from the commencement, or gradually become so. If, in these cases, the symptoms, especially those connected with the organic functions, the senses and cerebral manifestations, evince neither vascular action nor organic lesion within the cranium, tonics conjoined with anodynes, antispasmodics, or carminatives, according to the peculiarities of the case, should be resorted to. The preparations of cinchona, of valerian, of arnica, of assafoetida, and of ammonia; camphor in full doses; the æthers; the carbonate of iron, the nitrate of silver, &c., are then severally indicated, and may be given with opium, or with the acetate or muriate of morphia, or with hyoscyamus, or with belladonna, according to circumstances. If there be prolonged watchfulness, a suitable narcotic should be exhibited at, or shortly before, bedtime. I have found the following medicines of great benefit in some very severe cases of this kind, the pills (No. 245.) having been taken, in addition to the mixture (No. 246.), during the violence of the attack. An increased dose of the pills, or the anodyne draught, may also be given at night. *Formulae* 24, 25, 36, 269, 367, 423, 539, 557^{ed} described in the *Appendix*, also, may be resorted to in this variety of headach.

2. viii. J. B. Camphoræ rase gr. xij. — xvij.; Extracti hyoscyami 3 ss.; Conserv. Rosarum q. s. ut fiant Pillule quæ quatuor capiat duas, quartâ vel quintâ quaque horâ.
No. 246. R. Infusi Valerianæ 3 x.; Sodæ Subcarbonatæ gr. xij.; Spiritus Ammoniac fustid. 3 j.; Spiritus Sædis and Comp. iii xx.; Tinct. Aurantii Co. 3 j. M. ady. Haustus, quartis, quintis, vel sextis horis sumendus.
perfo. 247. R. Quinins Sulphatis, Camphoræ rase, æâ per. a.; Extr. Aloës purif. gr. xij. Extr. Hyoscyami 3 ss.; per. a.; Acaciæ q. s. M. Fiant Pillule xiv, quarum capiat unam, vel duas, vel tres, bis terve in die

41. B. *Congestive Headach* should be treated according to the age, habit of body, and constitutional power of the patient; and to the local as well as general state of the circulation. It should not be overlooked, that vascular action in the brain, owing either to impaired vital power of the capillaries, and of the organ generally, or to impeded return of blood by the veins and sinuses, is insufficient for the due performance of the several functions of this part of the frame. — a. In delicate or irritable persons, stomachic or mild purgatives, tepid or cold sponging the head with fluids containing aromatic and fragrant substances, as lavender or Cologne water; derivatives, especially warm or stimulating pediluvia; the internal exhibition of camphor, ammonia, valerian, gentle tonics, &c.; light diet, and moderate

exercise in the open air; will prove most serviceable. Local bloodletting will seldom be required, even in small quantity; blisters behind the ears will be productive of benefit, in some cases; and the effusion of tepid water on the head, in others. As the patient's strength improves, cold sponging the head or the shower bath, and friction of the scalp, will be useful in preventing a return of the affection. Where there is much irritability, the combination of hyoscyamus, or of small doses of the powder or extract of belladonna, with the medicines just named, and strict attention to diet, air, and exercise, will generally be found of advantage.

42. b. When this form of headach affects persons whose vital powers have been exhausted by dissipation and unrestrained indulgences, or those of a leucophlegmatic habit of body, the treatment should be still more restorative, tonic, or stimulant than the foregoing (§ 41.). Even local depletions will be injurious, and the cold affusion on the head will be of little service, unless the affection has followed the use of narcotics, or when the head is hot. Cordial stomachic aperients, warm spiced wine, or coffee; the preparations of ammonia, or of camphor, or of valerian, or of arnica, &c.; stimulating pediluvia; and blisters behind the ears, or on the temples, or even on the head, in extreme cases; are amongst the most appropriate remedies in cases of this kind. After these have relieved the more distressing symptoms, the complete removal of the disorder, and the prevention of a return of it, may be attempted, by promoting the digestive, the assimilating, and the excreting functions; by the use of tonics — of the preparations of bark or of iron; and by mild chalybeate and aerated mineral waters. But, before these are prescribed, the secretions and excretions should be freely evacuated, and their morbid states corrected, by alteratives and mild purgatives (F. 205, 266, 430.). And, during the course of restorative medicines, these should be frequently resorted to. The facitious mineral waters of Carlsbad, Marienbad, or of Pyrmont or Spa, subsequently may be cautiously tried; but those of Seidschutz or Pullna should, in many cases, precede the use of these.

43. When congestive headach occurs in the plethoric, the indolent, and well-fed; in persons about or past middle age, or who have experienced obstructions of the liver, or of any accustomed evacuation; the treatment should be very different from the above. General or local bloodletting, the affusion of cold water on the head, brisk cathartics, and derivation to the extremities by warm and stimulating pediluvia or manuluvia, are chiefly to be depended upon. But these will fail of being permanently useful, unless the diet of the patient be restricted, and regular exercise be taken in the open air. The secretions and excretions ought, also, to be freely and regularly promoted. A daily recourse to the shower bath will prove of great service.

44. d. When this form of headach proceeds from prolonged or intense mental application or exertion, not only should the above means be adopted, according to the age, strength, habit of body, and modes of living of the patient; but entire relaxation of the mind, change of air, travelling, the amusements of watering places, sea-voyaging, early hours, light reading, and

horse exercise, should be enjoyed, as circumstances may permit. At the same time, the miners' waters most suited to the peculiarities of the case may be taken, especially those that are deobstruent, aperient, and gently tonic; and, whilst the functions of digestion and assimilation are promoted by restoratives, and by breathing an open dry air, the secreting and excreting actions of the abdominal viscera should receive strict attention.

45. *C. Plethoric and Inflammatory Headach* requires the adoption of the means just enumerated (§ 43.), but in a much more active manner. The regimen ought to be strictly antiphlogistic; and permanent derivation, or counter-irritation, established by means of issues or setons in the nape of the neck, or of the tartar emetic ointment, or of croton oil, applied in this situation and in its vicinity. The bowels ought, also, to be copiously and frequently acted upon. When this form of headach follows the disappearance of accustomed discharges or eruptions, or of hemorrhages, this treatment should be most strictly enforced, and the use of external as well as internal derivatives strenuously persisted in. (See BRAIN—Congestion of, § 139., and Inflammation of, § 191.)

46. *D. Dyspeptic and Bilious Headachs.* — *a.* The former will be remedied by the means advised in the article on INDIGESTION. I may, however, state in this place, that, when this headach is attended by nausea, and when it is clearly ascertained that the sickness does not proceed from inflammatory action within the cranium, an ipecacuanha emetic, vomiting being promoted by drinking chamomile tea or warm water, will generally give relief. After the stomach is evacuated, and the nausea is gone, a mild purgative, as the compound rhubarb pill; or the sulphate of magnesia, with carbonate of magnesia and a carminative spirit or tincture in an aromatic water; or rhubarb with magnesia or an alkaline subcarbonate, and any aromatic or carminative medicine, will give further relief, by changing the state of the secretions in the stomach and upper part of the intestines, and by promoting the excreting functions of the latter, and of the large bowels. If nausea be not present, these purgatives should be given forthwith, and repeated until the bowels are freely evacuated. Suitable light diet, exercise in the open air, and an occasional recourse to these or similar aperients, will prevent a return of the affection. I have found the following most serviceable, when given with this intention, in moderate doses. In larger doses, they will also remove the complaint.

No. 248. R. Pulveris Rhei ʒss.; Extr. Felle Bovini, Extr. Aloës purificati, aa ʒi.; Saponis Duri gr. xv.; Pulv. Ipecacuanhæ, Pulveris Capsici, aa gr. xij.; Balsami Peruviani, Olei Carui, aa gutt. viij. Contunde bene simul, et massam divide in Pilulas xxxvj., quarum capiat unam vel duas, cum prandio, vel horâ somni.

No. 249. R. Infusi Gentianæ Comp., Infusi Sennæ Comp., aa ʒiij.; Sodæ Sub-carbon. ʒij. (vel Magnesie Sulphatis ʒvj.); Tinct. Jalap. ʒjss.; Tinct. Sennæ, et Tinct. Cardamom. Comp., aa ʒiijss. M. Fiat Mist., cujus capiat Coch. iij. ampla horâ somni, vel Coch. iv. primo mane.

47. *b.* When bilious headach seems to depend upon the congestion or accumulation of bile in the biliary passages, then chologogues, particularly calomel or blue pill, should be given, and followed, after a few hours, by a stomachic purgative, which should be repeated until a full effect is produced. In these cases, it will often

be necessary to repeat the mercurial, as well as the purgative, oftener than once; the infusion of senna, or equal parts of it and of a tonic infusion, being given with an alkaline subcarbonate, or with a neutral salt and the extract of taraxacum, or the supertartrate of potash in large doses, with the confection of senna, and this extract. When the headach seems to proceed from an exuberance of acrid bile, then demulcents with cooling aperients, or with alkaline carbonates, saline medicines in a state of effervescence, and warm mucilaginous diluents, are generally useful. In cases of this kind, it is necessary to dilute the acrid secretions, to evacuate them from the bowels, and to protect the digestive mucous surface from their irritating operation. When the acidity of the bile is the consequence merely of its retention and accumulation in the biliary apparatus, then these means will be sufficient to remove disorder; but when it depends upon the exuberance in the blood of the elements whence bile is formed, or upon a morbid action in the liver, a vegetable or farinaceous diet, bland fluids, the alkaline carbonates and refrigerants in camphor mixture, regular exercise, especially of the muscles of the upper extremities and of the trunk, are then required. If the action of the liver is not improved by these means, recourse should be had to mercurial alteratives or aperients; and, if it be connected with vascular excitement, or determination to the organ, local depletions, antimonial preparations, diaphoretics and diuretics, external derivatives, and the antiphlogistic regimen, should be prescribed. In every case, fecal accumulations and morbid secretions should be regularly evacuated by the means already advised.

48. *D. Organic or Cerebral Headach.* — When the patient complains of increased pain in the head on moving it, of spasms or pains in the limbs, or of impaired sensibility or motion of them, of sickness, and of any of the characteristic symptoms of this variety (§ 25.), depletions, general or local, according to the peculiarities of the case, deobstruent purgatives; internal derivatives, blisters applied on the neck behind the ears and kept long discharging, setons or issues, low diet, mental and bodily repose, and local or general refrigerants, or diaphoretics, as circumstances indicate, then constitute the principal means of affording relief. After these have removed vascular excitement, small doses of the bichloride of mercury, or of the iodide of mercury, or of the hydriodate of potash, or of the ioduretted hydriodate of potash, or of the arsenical solution, may be prescribed, and continued until the effects are ascertained. But external derivation should be also persisted in. (See also arts. BRAIN, § 211. 222., and PALSY.)

49. *E. Pericranial Headach.* — When the affection proceeds from disease of the pericranium or of the cranial bones (§ 26.), the treatment is essentially the same as that just advised (§ 48.); but it may be modified to meet various peculiarities and changes. If the affection is syphilitic, the bichloride of mercury, or the iodide of mercury, or the other preparations of iodine above mentioned, may be employed. If the periosteum, or the bone, be diseased, an incision should be made down to the affected part, and a free discharge afterwards maintained, as successfully

practised by Mr. PEARSON and Sir B. C. BRODIE. If this affection have proceeded from inflammation of the ear, the discharge from the external meatus of the organ should be allowed a free egress. (See EAR — *Inflammation of*, § 26—29.)

50. *F. Rheumatic and Arthritic Headachs* should be treated with strict reference to the diathesis or constitutional disorder. — *a.* If *rheumatic headach* is not associated with inflammatory action of the membranes, the head should be kept warm, and the secretions and excretions freely promoted and evacuated. After biliary and fecal accumulations have been carried off, camphor, ammonia, and colchicum, may be given in conjunction; or one or more of these may be taken with bark or any other tonic; or with magnesia, or with the subcarbonate of soda or potash, especially when the urine deposits a copious sediment, or is acid. If severe symptomatic fever, or signs of inflammatory action in the cerebral membranes, accompany the rheumatic affection of the head, local depletions, antimonials, active cathartics, and derivatives, should be prescribed, and colchicum freely exhibited. But, when these symptoms are absent, either of the following medicines will generally give relief; a full dose of calomel, or of blue pill with James's powder, or some antimonial, having been taken at bed-time, and a stomachic purgative the following morning, and repeated according to circumstances: —

No. 250. R. Camphoræ rasæ, Quinæ Sulphatis, Pulveris Radicis Colchici, aa gr. xvij.; Extracti Hyoscyami 3 ss.; Conserv. Rosar. q. s. M. Fiat Filulæ xlv., quarum capiat duas, bis terve in die. — vel

No. 251. R. Sodæ Sub-carbon. ʒj.; Tinct. Colchici Comp. 3 ss.; Tinct. Cardamom. Co. ʒj.; Decocti Cinchonæ (vel Infusi Cascarillæ) 3 x.; Spiritus Lavandul. Comp. ℥i. M. Fiat Haustus, ter in die sumendus.

51. *b. Arthritic headach* sometimes requires local depletions, from the nape of the neck and from behind the ears, especially in plethoric or robust persons; but a too great quantity of blood should not be taken away. The lower extremities ought to be put in warm water, containing flour of mustard and salt; and if the headach is not very much relieved by these means, mustard

may be applied to the feet. *Colchicum*

may also be prescribed, with aperient or purgative

medicines, and with magnesia, or the alkaline carbonates, as recommended in the article

GOUT (§ 55. 82. *et seq.*). In these cases, the

colchicum, when given in small or suitable doses,

may be continued for some time, in order to insure

action on the liver and on the kidneys, seems

to favour the elimination of the superabundant

urea from the blood; a great excess of this substance

in the circulation being generally connected with the production of the gouty

affection, in all its modes of manifestation. As

urea is the sum or ultimate product of assimilation,

or results from a combination of the effete

elements of human organisation; and as it is

liable to accumulate in the blood when the

functions of excretion are impaired, owing to

weakened organic nervous power (see art. GOUT,

§ 40—42.); so it is not improbable, that, when it

is thus superabundant, it becomes an excitant not

only of morbid or altered sensibility, but also of

increased vascular action, and of local determination,

— that, in short, it is the *materies morbi* of

the ancients, and one of the forms which effete

and excrementitious elements in the blood as-

sume; and that it constitutes a part of the morbid

condition, of which I have shown gout to be the chief manifestation. This view is supported by the experiments of PROUT, CHELUS, and others, showing the superabundance of urea, and its combinations in the urine, when the actions of the kidneys are freely exerted, towards the decline of the gouty attack.

52. *II.* It is unnecessary to enter into the treatment of the other symptomatic varieties of headach, inasmuch as the means of cure for them are essentially the same as are fully stated in the articles on those diseases, of which headach is a frequent symptom. — *a.* When the pain is *intermittent*, independent of organic lesion, and one of the forms which *masked ague* assumes, then a full dose of calomel, with James's powder, or of any other mercurial alternative, at bed-time, a brisk cathartic draught early the following morning, and, after the operation of these, the sulphate of quinine with camphor, or the preparations of bark and serpentaria, will remove the affection.

— *b.* If the headach be *hysterical*, the means already advised for *nervous headach* (§ 40.) will generally remedy it. If, however, the pain be symptomatic of disorder of the uterine, or of the urinary, functions, the means of cure must be directed to the restoration of these functions to the healthy state, as shown in the articles on MENSTRUATION, URINE, and UTERUS; and to the removal of vascular plethora, by evacuations and derivatives, especially when the affection depends upon this state of the circulation, or arises from suppressed or diminished secretion or excretion. (See *Treatment of Plethoric HEADACH*, § 45.) — *c.* The headach attending *hypochondriacal affections* is frequently relieved by the means advised for dyspeptic and bilious headachs (§ 46.); but the treatment may be conducted in all respects as directed in the article on HYPOCHONDRIASIS. — *d.* *Local or neuralgic headachs* (§ 35.) require the removal of the cause of irritation, when it can be accomplished, and generally the means already advised for the nervous and congestive varieties (§ 40—44.), —

sometimes a constant and energetic action to be exerted upon the intestinal canal, — frequently the exhibition of tonics, stimulants, and narcotics, or anodynes, — occasionally external irritants, or venicatories, as moxas, croton oil applied to the surface, the tartar. emetic ointment, issues, blisters, &c., — in some instances, the application of narcotics, as veratria, &c., to the part affected, or of the acetate of morphia to the skin denuded of its cuticle, and the other means mentioned in the article on NEURALGIC AFFECTIONS.

53. *XV. BRIEF ACCOUNT OF REMEDIES RECOMMENDED BY AUTHORS. — A. Evacuants. — a.*

Emetics have been advised for headachs by CÆLIUS AURELIANUS, HORSTIUS, RULAND, RIEDLIN, and FRANK; and are often of great benefit when the pain proceeds from injurious ingesta, from the accumulation of bile in the biliary passages, or from impeded circulation in the vena porta. — *b.* *Purgatives* are not less useful; and have been very generally, but often empirically, prescribed for headachs. SELIG

trusted chiefly to them for the removal of the intermittent form of the affection. Considerable judgment is, however, requisite in the selection of medicines of this class, and in the combination of them with other substances, so as to secure all

the advantages they are calculated to afford. *ARETÆUS*, and many others of the ancients, employed *hellebore*. When the pain arises from accumulations of bile, or from obstructions to the excretion of this fluid, then *calomel*, conjoined with some other purgative, and occasionally also with antimony, or with *ipecacuanha*, is most appropriate. In the nervous, the congestive, the dyspeptic, the periodic, and in the hypochondriacal forms of headach, the stomachic purgatives prescribed above (§46.), or the combination of a purgative with a tonic, carminative, or aromatic, &c. (F. 215. 266. 379.), will be found most serviceable. — *c. Vascular depletions* are requisite in plethoric and inflammatory headachs. *Bleeding* from the arm, sometimes from a vein in the foot, or *cupping* on the nape, are the most eligible modes. *ARETÆUS*, *CÆLIUS AURELIANUS*, and *VALERIUS*, preferred cupping on the head itself. I have repeatedly directed it to be performed on the occiput, behind the ears, or on the temples; and, when a small quantity of blood is to be taken away, these are often preferable situations. *Leeches* may be applied in circumstances similar to those requiring cupping. *Arteriotomy* has received the sanction of *ARETÆUS*, *SCHENCK*, *WEPFER*, *WILLIS*, *ZACUTUS LUSITANUS*, and of many recent writers; but I believe that it possesses no advantages above the other modes of vascular depletion, even in the most inflammatory form of the complaint. — *d. Sudorifics* are most beneficial in the febrile, inflammatory, rheumatic, and periodic states of the affection. In the last of these, they have been prescribed by *MORGAGNI*. The selection of sudorifics or diaphoretics should be guided by the state of the general circulation, and of vascular action in the head. When either the former or the latter is excited, *tartarised antimony*, in frequent doses, or *James's powder*, and the more refrigerant diaphoretics, are most appropriate; but when the head is cool, and the pain is connected with rheumatism, depression of vital power, and suppressed cutaneous function, the *warm*, or vapour bath, *camphor*, the *mistura guaiaci*, or weak infusions of *serpentaria*, or of *arnica*, or of *briony*, will be more beneficial than antimonials, unless these latter be conjoined with opiates and restoratives.

54. *B. Stimulants and Antispasmodics.*—These are serviceable chiefly in the nervous, the rheumatic, the hypochondriacal, and the neuralgic forms of headach, and sometimes in the intermittent, the congestive, the dyspeptic, and hysterical. The medicines of this kind most commonly prescribed are, the preparations of *camphor* and *ammonia*, the *succinated* and *fetid spirits of ammonia*, the *athers*, *castor*, *musk*, *serpentaria*, *spirits of lavender*, &c.—Besides these, preparations of *arnica* have been recommended by *SELIO*, *DUMANGIN*, and *J. FRANK*; *cajuput oil**, by *THUNBERG*; a strong infusion of *coffee*, by *BAGLIVI* and *PERCIVAL*; an infusion of *verbena*, *betonica officinalis*, and *semina coriandri*, by *J. FRANK*; and the *ledum palustre* by *LINNEÆUS*. *Valerian* has been praised by *STRANDBERG* and *FORDYCE*. I have found the infusion, with the ammoniated tincture, of *valerian*, or the foetid spirit of am-

monia, of great benefit in the headachs just mentioned. *Black pepper* has been recommended by *LANGE* in the dyspeptic variety; and its active principle, *piperine*, has been employed in the intermittent form of the affection. *Guaiacum* has been prescribed by *J. FRANK* in rheumatic and arthritic headachs. It is of service in combination with colchicum and magnesia, or with an alkali. *Green tea* and *coffee* are very commonly resorted to in the above forms of headach, as domestic remedies.

55. *C. Tonics.*—*a.* The preparations of *bark* are generally beneficial in the periodic and non-inflammatory kinds of this complaint. The *sulphate of quinine* is now generally preferred; but, in many cases, the decoction of *cinchona*, with the compound tincture, and an alkaline subcarbonate, will be more efficacious. — *b. Absinthium* was most frequently employed by the older writers. *RIVERIUS* conjoined it, or other bitters, with purgatives; a practice deserving of more general adoption. — *c.* The *cascurilla bark* was used, for nervous and dyspeptic headachs, by *RIEDELIN*; and is excelled only by *cinchona*. — *d.* The *muriate of ammonia* is also of service in the nervous and intermittent varieties. — *e.* The *arsenical solution** was praised by *DARWIN*. I have prescribed it, and taken it myself, for headach, with marked benefit. — *f.* The *muriate of baryta* was recommended by *HUFELAND*, for the pains proceeding from, or connected with, scrofulous disease. — *g.* The preparations of *iodine* are, however, more deserving of adoption, when the complaint is thus associated, and when it depends upon organic lesion. They may be given with any of the narcotics about to be mentioned. I have lately proved their efficacy in the rheumatic variety of headach, arising from the gonorrhoeal infection. The *hydriodate of potash* is preferable in this latter form; and, indeed, in several others. — *h.* The extract of *nux vomica* is mentioned by *HORN*, and may be given in small doses, as a tonic, in the nervous, the rheumatic, and the hypochondriacal varieties; but its effects must be carefully watched. It is a serviceable active principle, *strychnine*, which has been prescribed only in very minute doses.

56. *D. Narcotics and Anodynes* have been employed in several of the varieties of headach, both externally and internally. — *a.* *Opium*, in various forms, has been directed by *WHYTT*, *MACLEOD*, *SINNA*, *J. FRANK*, *W. STOKES*, and many others, especially in the nervous, the rheumatic, and the intermittent kinds of the complaint. The *acetate muriate of morphia* are now generally used; but they, as well as other preparations of opium, should be conjoined with camphor, or with an aromatic, in order to insure their good effects. — *b.* *Aconitine*, in the form principally of extract, was praised by *STORCK* and *VOGEL*; and was once much employed in rheumatic and chronic headachs. It is certainly often beneficial in these, as well as in the nervous varieties; but it should be given in small doses, and its effects carefully observed. *Aconitine*, the active principle, is to be preferred as an external application, in the neuralgic or rheumatic states of the complaint; but even in these it requires the utmost caution. The powder of the root, or of the leaves, may sometimes be ordered with advantage. I was lately consulted in a case where the incautious employment of aconitine caused an apoplec-

* *HUMBERT* prescribed the *cajuput oil* externally; but I have ordered it to be taken internally, and with great benefit.

tic seizure, and hemiplegia. — *c. Belladonna* has been used in somewhat similar cases to those for which the aconitum has been exhibited. The extract, or the powder of the root or of the leaves, may be given, either alone, or with camphor, or an aromatic. I prescribed it in a case of hypochondriacal headach, with much benefit. — *d. Hyoscyamus* has likewise been recommended by STORCK, RENARD, and others. I have found it of great use when combined as just stated, or when conjoined with ipecacuanha and some stimulating antispasmodic, and given in a decided dose. — *e. Conium* was directed by LETT-SOM; the distilled laurel-water, by J. FRANK; and the prussic acid, by GOOP. *Digitalis* is considered by FRANK as very beneficial in the headach proceeding from scrofulous disease. — *f. Stramonium* has been prescribed by several writers. I have seen it given with benefit.

57. *E. Alteratives* are required whenever the affection of the head appears to depend upon a morbid state of the secretions, upon impaired action of the chief excreting viscera, or upon an impure state of the circulating fluids. — *a.* Of these, *mercurials* are the most active, and most generally used, both internally and externally, for this complaint. *Calomel* was prescribed largely by WEPFER, VELSCHIUS, BANG, &c. It is most serviceable when the headach depends upon accumulations or obstructions of the bile, and a torpid state of the bowels, and when conjoined with, or followed by, other purgatives. In the rheumatic form it is advantageously conjoined with antimony and opium. The *blue pill* may be prescribed on similar occasions, and in the same manner. The *bichloride of mercury* was preferred by LENTIN, DE MONETA, VAN SWIETEN, and GMELIN, especially in the headachs depending upon organic lesions within the cranium, or upon disease of the bones. In these, as well as in some other cases, it may be prescribed in a tonic tincture or decoction. The *iodide of mercury* may be used in similar circumstances. *Mercurials* were pushed to *salivation* by WILLIS, LENTIN, DARWIN, and BLANC; but this is rarely required unless when the pain is not relieved by other means, or proceeds from a syphilitic taint. — *b. Alkalies*, particularly the subcarbonates of soda or of potash (FULENIUS), the solution of potash, or BRANDISH's alkaline solution, are often of service, when given in tonic or aperient infusions or mixtures, and aided by the action or extract of *taraxacum*. — *c.* An infusion of two or three drachms of the *elematis vitalba*, in a pint of boiling water, was recommended by STORCK and MÜLLER, to be taken in the twenty-four hours. — *d.* The decoctions of *sarsaparilla* are more deserving of adoption, and may be made the vehicles for the exhibition of other medicines which produce an alterative effect, as the bichloride of mercury, the hydriodate of potash, the alkalies, the extract of taraxacum, &c. — *e.* The *alkaline chlorides* may be also tried. — *f.* The precipitated sulphur will be found beneficial in the rheumatic form of the complaint, if taken daily in sufficient quantity to exert a gentle action on the bowels. — *g.* The preparations of *colchicum*, when given in small doses, and conjoined with magnesia, or with sarsaparilla and the alkalies, also exert an alterative operation, as explained above (§ 52.); and are of great use in

the arthritic and rheumatic forms of the affection. — *h.* Various *mineral springs* are extremely serviceable; but they require to be appropriately prescribed. Those containing iron, fixed air, lime, or the alkaline carbonates, are most suited to the nervous, neuralgic, rheumatic, and dyspeptic varieties; those holding sulphur, &c., in the rheumatic, arthritic, bilious, hypochondriacal, &c.; and those containing the purgative salts, in the bilious, arthritic, hypochondriacal, &c.

58. *F. Derivatives* — whether those which exert an immediate and brief effect, or those which act more slowly but permanently — are of great benefit in several forms of headach. — *a.* To the former class, *purgatives* may be said to belong; as they not only increase secretion and excretion, but also determine the fluids to the digestive canal. — *b. Masticatories* were employed for headachs by CELSUS, ARNÆUS, FORSTUS, MURALT, and many others; but they have now fallen into disuse. Nevertheless, they are frequently of service. — *c.* The same remark applies to *sternutatories*, which have been recommended by the same writers, and have experienced the same fate. The benefit derived from various *cephalic snuffs* is undoubted, even in cases that have resisted other means; and has led to their adoption as empirical remedies, in irregular and domestic practice. They are beneficial in exciting the olfactory nerves, and thereby the cerebral functions, and in procuring a defluxion from the Schneiderian membrane. — *d. Warm pediluvia* and *manuluvia* are often resorted to, especially when the extremities are cold, or when the pain depends upon determination of blood to the head. In these circumstances, the addition of mustard and of salt to the water will be of service. — *e. Sinapisms*, and *stinging* with nettles, or *urtications*, were employed by the ancients in the treatment of headach. CELSUS, ARETÆUS, and others, directed sinapisms to the head, over the seat of pain; but THEMISON contended for their application to the lower extremities. — *f. Blisters* on the nape, sometimes on the extremities, are now more generally prescribed. — *g. Setons and issues*, in these situations, or in the arm, are commonly recommended in the more obstinate cases of the complaint; and when the pain is suspected to arise from organic lesion. They are praised by RIVERIUS, ZACUTUS LUSITANUS, HOLLER, FABRICIUS HILPANUS, HEISTER, PURMANN, and DE HAEN. I have prescribed them in several cases with benefit. — *h.* The *tartarised antimonial ointment* has also been of advantage when applied on the nape of the neck, and its effects on the integuments fully procured.

59. *G. Topical Means*. — *a.* The application of cold to the head or temples, in various modes, has been advised by most writers, when the pain proceeds from determination of blood to, or inflammatory action of, the brain or membranes. A recourse to the *affusion* of cold or tepid water on the head; and the repetition of either, according to the grade of vascular action in it, are often preferable to the continued application of great cold, which is sometimes productive of mischief. Cold sponging, cold lotions, or epithems, wetting the forehead and temples with æther, or with aromatic waters, &c., and the shower bath, are severally of benefit, especially in the plethoric or inflammatory states of the affection; but the *douche*, or

affusion, should be preferred in the congestive form, especially when caused by narcotics. — *b.* Warm applications and warm coverings on the head have been sanctioned by CÆLIUS, LANGE, and many others. In nervous and rheumatic headachs especially, they are frequently of great service. ALEXANDER TRALLIANUS prescribed them in the form of emollient fomentations. DIEMERBROECK and MARCUS directed fomentations with aromatic herbs; and J. FRANK warm epithems, moistened with a decoction of *verbena* and *betonica officinalis*. Hot sinapisms applied over the affected part have been resorted to by some of the ancients (§ 58.). — *c.* Blisters on the head are occasionally of service, especially in the congestive and rheumatic varieties of headach; but they require much discrimination. They have been applied to the scalp by RIVETUS, SCHNADER, BANG, POUTFAU, AUBERT, MONRO, and others; but, unless in some cases of the varieties just stated, they are more useful behind the ears, where they may be kept open for some time, or often repeated. — *d.* Stimulating liniments (F. 299. 311.), rubbed assiduously on the scalp, are sometimes of service, when cautiously prescribed, in nervous, rheumatic, and neuralgic headachs, or hemicrania. Liniments, also, containing acetate of morphia, or the extract of *belladonna*, or of *aconitum*, or of *hyoscyamus*, or of *stramonium*, or of *opium*, have been advised, by several writers, to be rubbed upon the scalp, in obstinate cases of this kind. I have found them of service in several instances, although it was doubtful whether they, or a full dose of acetate of morphia, given with aromatic spirits, that was also prescribed in some of the cases, had produced the effect. Very recently, ointments, containing *veratrum*, *aconitine*, or other acro-narcotic substances, have been directed to be similarly applied in these affections. I have seen benefit derived from them in two or three instances; but I have known others where they either failed in giving relief, or seemed to be injurious. The propriety of having recourse to them is often doubtful. — *e.* The tartarised antimonial ointment may be used in the varieties of headach just mentioned, or even where organic lesion within the cranium is suspected; but the effects of it, as well as of liniments, ought to be carefully watched. — *f.* Frictions of the scalp have been advised by GILBERT and others, and have been of advantage when regularly and assiduously practised. — *g.* Compression of the carotids, although suggested by SHAPION and PARRY, is undeserving of further notice. The same remark is applicable to strait cinctures of the head, advised by some writers. — *h.* The actual cautery, applied to the seat of pain, has been recommended by HIPPOCRATES, CÆLIUS, ARETÆUS, VELSCHIUS, AULAGNIER, VALENTIN, and by other ancient and modern writers. It is, however, reprobated by CÆLIUS AURELIANUS, and is now rarely had recourse to. — *i.* The application of *moxas*—a modification of this practice—has been long adopted in Eastern countries; and has been advised by PASCAL, SAISSEY, LARREY, J. FRANK, and others. WEPFER advises the *moxas* to be placed in the course of the coronal suture; POUTFAU, on the vertex; and VELSCHIUS, on the temples. — *k.* Incisions of the scalp, in the seat of pain, have been directed by LE BRUYER,

SILVERINUS, GRATELOUP, TISSOT, and SUMEIRE. They are more serviceable in disease of the pericranium, or of the bones of the cranium. Issues in the scalp have been sanctioned by PURMANN and many others. I have seen benefit accrue from them in two instances. — *l.* Electricity and galvanism have been recommended by many in headachs; but they produce merely a temporary benefit, and are not always safe. — *m.* Trephining the cranium has been favourably noticed by BAGLIVI, MORGAGNI, MEEKREN, MARCHETTI, VOGEL, SCHMUCKER, and GOOD, and actually practised by some of them. It is only when the pain is very violent, confined to a single spot, has followed an external injury, and resists all other means, that the practice can be entertained. Mr. S. COOPER states, that he has seen two cases, in which the patients lost their lives by this treatment. — *n.* The extraction of carious teeth should not be neglected in hemicrania, or local pain of the head from this cause. In a case where this object could not be accomplished, and in another where it was objected to, I directed a strong solution of the acetate of morphia, to which aromatic spirits were largely added, to be rubbed upon the seat of pain; and complete relief was obtained. The application of *croûote* to the tooth, or of camphor, acetate of morphia, and capsicum conjoined, has also been of service.

60. In the sketch here given, I have mentioned only such means as seem deserving of a trial, or are calculated to be of service in some one or other of the numerous forms and circumstances in which headach is presented to the practitioner. I have furnished suggestions merely; but these will be useful even to the most experienced. The advantage to be derived from them will entirely depend upon the pathological acumen by which their application to particular cases may be guided.

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HEARING — IMPAIRED OR LOST.

CLASSIF. — 4. Class, 1. Order (Cullen).

4. Class, 2. Order (Good). IV. CLASS, III. ORDER (Author).

1. Those diseases of the organ of hearing which are not necessarily attended by impaired function, were considered under the article EAR. At this place, therefore, diminution, or loss of hearing — *Deafness* — will be considered with reference to the lesions which usually occasion it and to appropriate treatment. The disorders of hearing may be divided into — 1st, *Exaltation of this sense*; — 2d, *Depravation of hearing*; — 3d,

Impaired or lost hearing. — The first of these is merely symptomatic, and is observed chiefly in affection of the brain, and in fevers (see art. SYMPTOMATOLOGY); the second is fully considered at another place (see art. EAR, § 2.); the third only remains for discussion.

2. Before entering upon the consideration of the various lesions causing deafness, directions as to the best mode of inspecting the ear are required, as, unless the auditory passage be carefully examined, the diagnosis of affections of the ear must necessarily be very defective. — In consequence of the curvature of this passage, the bottom of it and the membrana tympani cannot be distinctly seen, unless the patient's head be very much inclined to the opposite side, the ear directed to the sun, or a strong light reflected into it, and the auricle drawn well upwards and outwards, whilst the tragus is pressed outwards. The rays of light may thus be made to fall upon the bottom of the meatus, provided that the external ear be sound. But when it is the seat of morbid changes, a *speculum* is requisite in order to convert the curvature of the passage into a straight line. This instrument should be nearly round, and funnel-shaped, the inside of the arms being blackened, or rendered dim. When the ear is examined with the aid of the *speculum*, the light of the sun, as recommended by Dr. KRAMER, should be preferred; but the light reflected from a small mirror may be employed.*

3. I. DEAFNESS FROM AFFECTIONS OF THE EXTERNAL EAR. — i. *Diseases of the Auricle*, especially erysipellatous inflammation extending to it, and boils, may impair the function of hearing, but never in a remarkable manner, nor permanently, unless the inflammation has extended to more internal parts; a circumstance which occasionally takes place. Dr. KRAMER notices the occurrence of scirrhus of the auricle, as a cause of deafness; but it is very rarely seen.

4. ii. *Diseases of the Auditory Passage and Membrane of the Tympanum*. — All affections of these parts are either inflammatory, or the consequence of inflammation in some one grade or other, affecting one or more of the tissues in this situation. The fact is ably supported by Dr. KRAMER, who remarks, that the different forms of disease seated in the auditory passage depend upon inflammation of the constituent structures, and they are characteristically defined, as one or other structure is affected. — The effects, therefore, of these inflammations can hardly be considered separate states of disease, unless they continue after the inflammation which caused them has disappeared.

5. A. *Erythematous inflammation of the auditory passage* generally causes accumulations of brownish hard wax, obstructing more or less the

* Writers on the diseases of the ear, with few exceptions, advise various instruments, each finding fault with those proposed by others; each lauding his own practice, and each detracting from the merits (such as they are) of his contemporaries. In this, however, the despised *aurists* do not stand alone; for all those who take a single organ under their especial protection — and what organ has not been thus distinguished? — belong to the same category, as they are most anxious entirely to appropriate the object of their adoption, and evince the utmost reluctance to those who attempt to encroach on their province. Verily, of all empirics, the regular in respect of qualification is the most uncompromising, and the most degrading to medical science and the character of the profession.

function of the organ. It sometimes occurs in persons of a cachectic habit of body, or in conjunction with chronic affections of the skin, and in connection with disorder of the digestive and excreting organs. It is often excited by substances that have passed into the ear, or by neglect of cleanliness, which, however, is not so frequent a cause as is generally supposed; the accumulation of hardened or morbid wax, with increased sensibility, pain, or soreness in the meatus, being the chief indications of the affection. In its slighter states, itching or formication in the passage is only felt.

6. The *Treatment of deafness from this cause* consists chiefly of syringing the meatus with tepid water, and of attending to the digestive and excreting functions, and to the general health. Mr. BUCHANAN recommends a small syringe with a slender point to be employed, fearing that the *membrana tympani* may be ruptured by the quantity of fluid injected, and by obstruction to the counter-current by the point of the instrument being too thick. Dr. KRAMER, however, considers that this precaution is unnecessary, as the membrane cannot be injured by the stream of water, and as the loosened wax will readily flow out with the water. He therefore uses a syringe that will contain an ounce and a half of water, the pipe being three quarters of an inch long, and the opening wide enough for a strong stream.

7. B. *Deafness from inflammation of the follicles of the auditory passage*, seldom is considerable, until the inflammatory action has given rise to some lesion of structure. — *Mucous or catarrhal otorrhœa* (see art. EAR, § 18.) is caused by the affection of these glands. From this inflammation, and from that of the *membrana tympani*, various excrescences or morbid growths in the meatus ultimately proceed. On inspection, redness and partial swelling of the walls of the passage are first observed; and, if the affection continues long, or becomes chronic, excrescences, or polypi, of a soft, spongy, or vesicular appearance, are gradually formed. These are red, sensitive, roundish, pedunculated, and readily bleed when irritated. In some cases, they have a broad hard base, are insensible, and not disposed to bleed. These obstruct more or less the meatus, and impede the functions of the organ. Hardened mucus and wax may also accumulate in the passage, as a consequence of the chronic states of this affection, and of the obstruction caused by these excrescences.

8. The *Treatment of this disease* should be directed according to the method just advised (§ 6.). The extirpation of the fungous growth should be performed; but, as M. ITARD has stated, the deafness may continue nevertheless; for the membrane of the drum may be thickened, or ulcerated, or covered by inspissated secretions; and otorrhœa will often long remain. In these cases, injections of tepid water, or of emollient and diluent fluids; blisters on the nape, and kept open, or setons or issues; and the means advised for the removal of *mucous otorrhœa* (see art. EAR, § 29.) should be prescribed.

9. C. *Deafness caused by phlegmonous inflammation of the cellular tissue of the passage*, rarely occurs: but this affection may be mistaken for the preceding; from which, however, it is readily

distinguished by its rapid course, and termination in abscess, — results never observed in inflammation of the follicles. Owing to the severity of the pain, and other symptoms, it may be confounded with inflammation of the internal ear; but, in this case, the external passage never presents any lesion on inspection, at least at the commencement. — This disease is usually caused by cold or currents of air. — The treatment is altogether the same as recommended for *external acute Otitis* (see EAR, § 27.).

10. D. *Inflammation of the periosteum of the passage*, is most common in children of a scrofulous diathesis, and generally occasions caries of the bony structure, which is readily detected with the probe. If exfoliation of the diseased bone occur, and the ulcerated part begins to heal, narrowing or obliteration of the meatus may take place. In these cases, the deafness often depends as much upon congestion of the adjoining parts, as upon swelling and disease of the passage. — Dr. KRAMER advises, in the treatment, that, when the parts show a tendency to close, they should be opened up by art, and maintained open by touching them with lunar caustic, throughout their extent. Hearing, however, usually continues very dull, owing to the natural form of the meatus having been lost, and to the membrane of the drum having become thickened.

11. F. *Deafness from disease of the membrane of the drum*. — It has been supposed, that relaxation of this membrane, that too great tension of it, that rupture of it, and that rupture of the tendon of the *tensor tympani*, may severally occasion impaired hearing. CLELAND, SAISSY, BECK, and others, think that these lesions may be produced by violent sneezing, by claps of thunder, by noises of artillery, &c.; but, as KRAMER contends, these suppositions are unfounded; rupture of these parts never occurring unless from inflammation and its consequences. He remarks, that perforation of the membrane is in rare cases met with, little or no mucous or purulent discharge having been observed; but, even these, upon examination, in a bright sunshine, are found to be a viscid, mucous, or puriform, always found at the bottom, and the remaining portion of the membrane is seen, reddened, thickened, and opaque.

12. a. *Inflammation of the membrane of the tympanum* most frequently occurs in connection with inflammation of one or other of the structures of the meatus, especially of the follicles. It may, however, take place primarily, and constitute the chief affection. Acute inflammation of this part is not so common as the sub-acute and chronic states; and either, when neglected, gives rise to opacity, thickening, perforation, purulent discharge, fungous or polypous excrescences, &c.; but the chronic states most frequently induce these lesions. In acute inflammation, the membrane is seen, on careful examination, more or less red, rough, swollen, and opaque. It often seems as if covered with small projecting glands or follicles. Sometimes bundles of vessels are seen in it, and the point of insertion of the handle of the malleus cannot be distinguished. Dr. KRAMER states, that inflammation of this part are distinguished from internal inflammations of the ear, not only by the greater mildness of the former, but especially by the changes of

the membrane presented by them from the commencement; whereas, in the latter, such changes cannot be detected early in the disease, however violent the symptoms and attendant fever may be; and occur only in the further course of the malady, when the membrane is about to burst from the pressure of accumulated matter, or has become involved in the inflammatory process. The different grades of this disease have been imputed to *nervous otalgia*, or confounded with it. Dr. KRAMER, however, denies the existence of such an affection. In this he is evidently mistaken (see EAR, § 6.); although it must be admitted, that both this, and other inflammatory diseases of the ear, are often improperly viewed as nervous merely. The hardened secretion in the meatus, to which the more chronic states of inflammation of the membrane have been imputed, is more commonly the result of inflammatory action, than its cause. The disease, in both its primary and its consecutive states, generally impairs hearing more or less.

13. *The Treatment* is the same in this as in the other inflammatory diseases of the meatus; and as directed for *inflammations of the external EAR* (§ 27. 29.). — Dr. KRAMER, however, prefers injections containing the acetate of lead; and pours a solution, varying in strength, from one grain to ten of the salt to an ounce of water, into the diseased ear, twice or thrice a day. Injections of a solution of the nitrate of silver, or of the sulphate of zinc, or of alum, have been also recommended; but unless they be weak, they often occasion pain and irritation in the meatus. A few drops of pyroligneous acid, to an ounce of water, have likewise been used as an injection. Both it, and the superacetate of lead, will effectually remove the offensive odour of the discharge.

14. *b. Deafness from perforation of the membrane of the drum.* — KRAMER states "that many authors, and among them even ITARD, are of opinion that the perforation of this membrane does not necessarily weaken the hearing." Now this is just: for M. ITARD contends, that, if the opening is small, the hearing in some cases is not materially impaired; although in the great majority it is more or less so; but that, when it is considerable, or when a large portion of the membrane is destroyed or detached, hearing is always very much injured. Although perforation of the membrane causes deafness, yet there are states of the ear, and even of the membrane itself, in which *artificial perforation* of it may be attended by some benefit. Such states are, however, few; and the instances of success from the operation have been rare or equivocal.

15. *Artificial perforation of the membrane* was first performed by Sir A. COOPER, many years since; but the circumstances requiring the operation were not fully understood, until explained by DELEAU and KRAMER. The latter of these writers remarks, that Sir A. COOPER supposed perforation of the membrane to be indicated chiefly in cases of obstruction of the Eustachian tube, and in extravasation of blood in the cavity of the tympanum; but, as he appears to have been unacquainted with catheterism of this tube, his diagnosis of the closure of it was altogether uncertain. Even supposing these morbid states actually to exist, they may be treated more

efficiently by introducing the catheter into the tube itself, than by perforating the membrane. ITARD contends, that the operation is admissible only when there is invincible obstruction in the tube; SAISSY advises it only in thickening and hardening of the membrane; and DELEAU recommends it also in this case, as well as in obstruction or obliteration of the Eustachian tube, and in obstruction of the cavity of the tympanum. Dr. KRAMER has recourse to the operation only when the *membrana tympani* is much thickened, quite insensible to the probe, hard as cartilage, and if the hearing is very impaired; but, even in this case, it should be performed only when both ears are affected with considerable deafness, and when the ear to be operated upon does not suffer from any other disease, by which the result might be rendered abortive.

16. II. DEAFNESS FROM DISEASE OF THE EUSTACHIAN TUBE AND CAVITY OF THE TYMPANUM. — I. *Affections of the Tube.* — The Eustachian tube may be obstructed — 1st, By the pressure of tumours in its vicinity; — 2d, By inflammation causing tumefaction of the mucous membrane, effusion, &c.; — and, 3d, By the more remote consequences of inflammation, namely, constriction or obliteration of a portion, or of the whole, of the canal. — Before, however, any of these can be accurately ascertained, it is necessary to have recourse to means of exploration similar to those employed in obstructions of some other canals. The introduction of tubes or catheters into the canal, in order to ascertain the nature of, and to remedy, various affections both of it, and of the cavity of the tympanum, has been resorted to by SABATIER, WATHEN, DOUGLAS, SAISSY, ITARD, and others. Through this tube, lukewarm water was sometimes injected by these writers, in order to judge of the state of the middle ear, according to the sensations produced by it, or by the total absence of sensation. DELEAU and KRAMER, however, rejected the use of water as an injection; and adopted the suggestion of CLELAND, to employ air instead of water, in the investigation and treatment of diseases of the tube and cavity of the tympanum. Dr. KRAMER recommends the usual silver inflexible catheters to be used; and air, compressed in an apparatus he describes, to be injected through it in the following manner: — "After the catheter has been introduced into the tube, and fixed by means of a frontlet, the patient is placed close to a table, on which he leans his elbow, holding with the hand of that side the pipe of the air-press filled with compressed air. The operator then introduces the metal beak of the pipe into the funnel-shaped dilatation of the catheter, applies his ear close to that which is being examined, opens the cock of the machine and listens to the sound, caused by the air rushing into the cavity of the drum. When the tube and cavity are free, the air strikes with an audible shock against the membrane of the tympanum. When the shock is over, or is slight, a blowing or rustling in the ear of the patient is heard, caused by the streaming of the air." All variations from this sound are morbid, and furnish more or less distinct indications of diseased changes in the organ. If the air-douche does not penetrate to the *membrana tympani*, Dr. KRAMER advises catgut bougies to be used for opening the passage in the tube.

17. *A. Inflammation of the mucous membrane of the Eustachian tube* occasions modified or different results, according to the intensity of the morbid action and the degree in which adjoining parts participate in the disease. — *a. Catarrhal inflammation*, or irritation of the tube, with accumulation of mucus obstructing it, is a not infrequent attendant upon catarrhal complaints, upon inflammations of the throat or fauces, and upon eruptive fevers; the deafness sometimes accompanying these diseases, arising from this affection of the tube. It is most common in moist, cold localities and climates, near the sea coast, and in foggy weather. — The *Treatment* should be directed to the removal of the primary disorder, especially the affection of the throat. If the deafness still continue, astringent gargles containing the sub-borate of soda, or the nitrate of potash, or the hydrochlorate of ammonia, or gargles with the decoction and tincture of bark and muriatic acid, or the internal use of iodine, may be of service. Aqueous injections into the guttural orifice of the Eustachian tube have been advised by SAISSY, IRARD, and others; but DELEAU and KRAMER prefer the air-douche just described, notwithstanding the good effects of these.

18. *b. Deafness from inflammation of the mucous membrane of the tube* may proceed from disease of the throat, or of the proper membrane of the drum; and be complicated with either, or with both these diseases. In the case of its connection with lesion in the cavity of the tympanum, it is either associated with, or has followed, acute *otitis* or *otorrhœa*. But when the inflammation is confined to the guttural part of the canal, deafness is neither great, nor attended by pain in the interior of the ear. The patient hears well at times, but only momentarily. He hears his own voice even worse than that of others; and occasionally has a crackling, gurgling, or detonating sensation in the throat leading to the ear. The diagnosis is still more to be depended upon, if pain or inflammation exists in the throat or fauces, and if the former be increased on gaping or mastication. The chronic states of this disease of the tube are generally connected with syphilis, or with the scrofulous diathesis.

19. *c. The Treatment* of the more acute states of inflammation of the tube should be entirely antiphlogistic. Local vascular depletions; active purgatives, especially calomel with antimony; cooling and detergent gargles, particularly those with the sub-borate of soda, or nitre, or hydrochlorate of ammonia; external derivatives, or the warm or vapour bath, and diaphoretics, are generally required. After vascular depletion, an emetic is sometimes of service; but, as this disease most frequently is consequent upon, or complicated with, an affection of the throat or ear, or occurs in the course of exanthematous fevers, the treatment of it must necessarily depend very much upon the nature and state of the primary or associated malady. When the disease of the tube is chronic, or consequent upon venereal affections of the throat, mercurials, especially the *bichloride of mercury*, gargles containing this substance, or the internal use of the *iodide of mercury*, should be resorted to. In the scrofulous diathesis, the preparations of *iodine* may be tried. In protracted or severe cases, especially when con-

nected with ulceration in the throat, or syphilis or scrofula, treatment is seldom successful, as they have very frequently gone on to the states next to be noticed.

20. *d. When the inflammation*, either from its protracted continuance, or from its extension to the connecting submucous cellular tissue of the tube, gives rise to *thickening of the mucous membrane*, or to *ulceration*, more or less complete *occlusion*, or *stricture*, or even *obliteration of the canal*, may result, especially when an ulcer is seated near the orifice of the tube, and afterwards cicatrises, as in cases of malignant angina, or of venereal ulceration of the throat. It is important to distinguish these lesions from those states of disease which admit of satisfactory treatment. This is to be done chiefly by ascertaining the history of the case: — If the deafness have followed severe affections of the throat, especially that occurring in connection with malignant eruptive diseases, with syphilis, or with scrofula; — if it have continued long, been constant and uninterrupted; — and if it have followed severe *otitis* or purulent *otorrhœa* (see art. EAR, § 10. 18.), — it may be inferred that one or other of the lesions just specified exists. If there be any doubt entertained, recourse to the means of exploration advised by IRARD, namely, by forcing water into the tube; or to that employed by DELEAU and KRAMER, and described above (§ 16.), will establish the diagnosis.

21. Perforation of the membrane of the tympanum has been resorted to by IRARD in cases of this kind; but with very equivocal success. Dr. KRAMER states that he has found them incurable; and that this operation has been of no use in them, as the mucous membrane of the cavity of the tympanum is also diseased. The introduction of catgut bougies into the Eustachian tube has not been productive of any permanent benefit. If obliteration of the canal be complete, the cavity of the drum is always involved in the disease; and, *à fortiori*, perforation of the *membrana tympani*, advised by some writers, can be of no avail.

22. *e. Deafness may depend upon the disease of the Eustachian tube by tumours pressing upon its guttural extremity.* — Enlarged tonsils are the most common cause of this form of deafness; but polypous or fungous excrescences, and enlarged parotids, also, not infrequently produce it. In either case, the diagnosis is very easy, and the indications of cure sufficiently manifest. Polypi must be removed by excision or ligature whenever either can be performed. When the tonsils are enlarged, scarifications, astringent and detergent gargles, stomachic purgatives and tonics, the preparations of iodine, and the other means of cure directed for *enlargement of the tonsils* (see the article), should be prescribed. If the tonsils contain matter, then puncture or incision of them ought not to be delayed. Enlarged parotids, if the affection be chronic, may be treated with iodine, &c.

23. *B. Inflammation of the cavity of the Tympanum.* — The inflammation may affect only the mucous membrane lining this cavity; or it may extend to the submucous cellular tissue, and even to the periosteum. It is generally either acute or chronic; and, in either case, is a severe and often dangerous disease. The symptoms, consequent lesions, and the treatment of this dis-

case in its various forms, are fully described in the article EAR (see § 14. *et seq.*). As deafness resulting from *purulent otorrhœa*, with perforation of the membrane of the tympanum, or from *disjunction or loss of the small bones of the ear*, or from *caries of the osseous structure*, belong to the more chronic states of *otitis*, and is discussed in the article just referred to (art. EAR, § 19. *et seq.*, and 28. *et seq.*), it is unnecessary to recur to the subject at this place.

24. *C. Deafness may arise from extravasation of blood in the cavity of the drum.* — This lesion is usually the result of external injury, of violent attacks of sneezing, or of constriction of the neck; but it is chiefly caused by the first of these. In cases of this kind, Sir A. COOPER advised perforation of the membrane; but the extravasated fluid will either pass off by the Eustachian tube, or be absorbed. Moreover, the deafness and other unfavourable symptoms existing in these cases, are not so much dependent upon the extravasation in the cavity of the ear, as upon the injury other parts of the organ, or even the brain and its membranes, may have sustained. When, however, blood is effused in the drum, inflammatory action not infrequently supervenes.

25. III. DEAFNESS FROM AFFECTIONS OF THE AUDITORY NERVES. — *Nervous Deafness.* — We can seldom arrive at just conclusions respecting deafness from this cause derived from direct phenomena. We can infer it only from the absence of those deviations from the healthy state that have already passed under consideration. When, in connection with the absence of these lesions, ascertained by a minute examination, and by having recourse to the air-douche, there are indications of disease within the cranium, or of some other malady with which the organ of hearing may be presumed to sympathise, then the existence of deafness from an affection of the auditory nerves may be considered as probable. In such cases, there is impaired or lost hearing, without any organic deviation in the ear; the lesion is either in the nerves, in their extension in the labyrinth, or in their course in the brain at or near their origins. It is, therefore, always difficult, frequently impossible, to determine the situation of the lesion; and still more so to ascertain whether the lesion consist of simply impaired or lost function of the nerves, or of interrupted action, owing to extraneous influences or morbid productions in their vicinity. In all cases, however, the absence of organic change in the ear itself should be previously made out. Dr. KRAMER states that most writers on the diseases of the ear — that SAUNDERS, SWAN, LENTIN, BECK, VERING, J. FRANK, and SAISSY, have been incapable of determining this preliminary part of the investigation; that CURTIS, STEVENSON, and WRIGHT are still worse authorities; and that ITARD and DELLAU are alone deserving of any confidence. Having consulted with M. ITARD, and frequently referred to his writings, I can bear testimony to his science and candour, and to the great value of his contributions to this department of medical knowledge.

26. Dr. KRAMER, with much of the spirit of the craft, but also with the science of the physician, severely criticises the writings of his contemporaries; rejects the distinctions of ITARD, which, however, appear to me more scientific

and correct than his own; and proposes a novel division of nervous deafness, and a new mode of treatment. He divides it into two forms, — the one attended by excitement or erethism — the other by torpor. Noise in the ears is always present in the former, but never in the latter. This symptom is often, however, attendant on very different diseases of the ear, but in a very indeterminate and inconstant manner. To determine, therefore, whether deafness with noises in the ear proceeds from disease in the organ, or from nervous affection merely, minute investigation and the means of diagnosis already mentioned must be had recourse to. But these are also requisite in the torpid form of nervous deafness. Mr. SWAN believes, that many cases, usually imputed to palsy of the auditory nerve, are occasioned by chronic thickening of the membrane lining the cavity of the tympanum, involving the small branches of nerves in this situation. This is not improbable; and, admitting it to obtain, Dr. KRAMER's mode of diagnosis will not always succeed, nor determine the existence or absence of true nervous deafness. On this subject, the views of M. ITARD are more pathological, and less empirical, than those of Dr. KRAMER; and therefore, in the few observations I have still to offer, I shall chiefly follow him.

27. *A. Deafness may proceed from compression of the auditory nerve.* — In most instances, however, this source of the affection cannot be accurately determined. A tumour may be developed, or purulent formations, or extravasated blood, may exist, in the course, or in the vicinity, or near the origin, of the seventh pair of nerves, interrupting the passage of impressions made on the organ to the sensorium; but this condition often can be only surmised. DUVERNEY and SANDIFORT found these nerves pressed upon by tumours; and SEVERINUS observed them surrounded by serum and effused blood. — If the tumour or morbid collection be considerable, then the extension of paralysis to the nerves of vision and of smell may favour the conjecture. BONET mentions a case in which hearing and sight were lost, and on dissection a tumour was found pressing on the nerves of these senses. THUMANN records a similar instance to this. ITARD found, in a man who had lost the hearing in the left ear, small tumours lying on the corresponding side of the cerebellum, and nearly two ounces of a thick fluid in the ventricle of the same side. In cases adduced by LIEUTAUD, in several detailed by LALLEMAND, and in some seen by myself, an abscess had formed in the part of the brain adjoining the ear, and, by pressure or consequent disorganisation, had destroyed the functions of the auditory nerve. (See art. EAR, § 21. *et seq.*)

28. *a. The Symptoms of deafness from compression of the nerve of hearing are* — severe and nearly constant headach, vertigo, noise in the ears, impaired sight, and weakness of the mental faculties, especially of the memory. The progress of this affection is generally very slow, although the internal disease producing it is ultimately fatal. In several instances mentioned by ITARD, it continued some years without materially affecting the general health. In two instances the above symptoms continued upwards of fifteen years. I also have known cases nearly as long protracted

as these. The case is most protracted when it proceeds from a tumour or morbid growth within the cranium.

29. *B. Deafness from palsy of the acoustic nerve.* — M. ITARD supposes that this nerve may be paralysed — (a) by a severe shock or commotion, — (b) by convulsions, — (c) by apoplexy, — (d) by fever, — and (e) from sympathy with some other organ. Without denying the possibility of these causes giving rise to palsy of the nerves of hearing, and even admitting that apoplexy or convulsions and fever will sometimes occasion it, yet the others may seem problematical. — a. It is probable that very loud noises, as a clap of thunder, or the explosions of artillery, may paralyse these nerves, especially as deafness from these and similar causes can be explained only after this manner, when symptoms of inflammation or of congestion of the ear, or of the brain, cannot be detected. M. ITARD believes, that the shock occasioned by falls in the lower parts of the body, or the counter-stroke occasioned in this and other ways, also may paralyse the auditory nerves; but this cause seems more doubtful than the preceding. When deafness has been occasioned by loud noises, hearing often returns spontaneously in a few days or weeks; but if the deafness persists for some months, it is rarely removed by treatment.

30. *b. Deafness sometimes follows convulsions.* — This is most frequently observed in children under four or five years of age. Many of the cases of deaf-dumbness originate in the convulsions occurring during the first dentition. But the deafness may not be the result of the convulsions; both the one and the other more probably being produced by some lesion at the origin of the acoustic nerves, or by effusion into the fourth ventricle, or by some change at the base of the brain, or about the medulla oblongata. When the loss of hearing is complicated with palsy of one side, or of one limb, the nature of the affection may be inferred; but when this is not the case, and when hearing in both ears is lost, the exact nature or seat of lesion can seldom be determined or even surmised. M. ITARD considers deafness occurring in this manner as quite incurable.

31. *c. Deafness from apoplexy* is a frequent occurrence; and may exist in one or both ears. — When hemiplegia has followed the apoplectic attack, the deafness is generally on the same side, and is then incurable; but when the patient is not far advanced in years, and when there has been no consecutive palsy, the affection of hearing may be somewhat ameliorated by the sole efforts of nature, or by the means about to be mentioned; but more frequently, especially in old persons, no advantage accrues to the hearing from treatment. — When deafness occurs early in typhoid and infectious fevers, it frequently continues after recovery from them. If a judicious application of remedies do not succeed in a reasonable time, and if the affection have been of long continuance, hearing is very rarely recovered.

32. *Treatment.* — When the deafness following these diseases is incomplete, and occurs in young persons, then blisters applied behind the ears, or moxas in the same situation; the vapour of ether, or of camphor; the internal use of stimulants, when there is no tendency to cerebral plethora; and the

use of stomachic purgatives and alteratives, to promote the secreting and excreting functions, may be resorted to; but recovery of hearing in these cases may proceed as much from spontaneous changes in the circulation within the head, and in the state of nervous power, as from the remedies prescribed. (See also § 37.)

33. *d. Deafness is sometimes symptomatic of, or associated with, disorders of the digestive organs.* — In these cases, the affection is generally slight; but it is sometimes very considerable and difficult of removal. Impaired and disordered digestion, deranged biliary secretion and excretion, a foul or loaded tongue, tumid abdomen, a morbid state of the evacuations, and an unhealthy aspect of the countenance and of the general surface, generally characterise this form of deafness. — The Treatment consists chiefly in the exhibition of emetics, followed by stomachic purgatives, and in attention to diet and regimen. The purgatives should be often repeated, and sometimes even the emetics ought to be given from time to time. After the secretions and excretions have somewhat improved, tonics and deobstruents, and the preparations of iron, may be prescribed; and be aided by blisters, or moxas applied behind the ears. — The disorder of the digestive organs associated with deafness is sometimes also connected with difficult dentition, as justly remarked by NUCK, HESSE, and ITARD; and occasionally the impaired digestive, assimilating and excreting functions, of which deafness is symptomatic, gives also rise to the production of intestinal worms. In these circumstances, the indications of cure are manifest. (See DENTITION — Difficult; and Worms — Intestinal.)

34. *e. Idiopathic paralysis of the acoustic nerves.* — This affection has been defined by ITARD to be a want of excitability in these nerves — a loss of their sensibility, independently of the circumstances or causes already passed in review. Its existence has been unjustly doubted by Dr. KRAMER. M. ITARD believes, however, that it may be congenital, or supervene at any period of life; but that it most frequently occurs after forty. It is often accompanied by headach; noise in the ears, and mental depression. Numbness, or want of sensation in the external ear, is sometimes present. M. ITARD has seen the organic sensibility of this part entirely lost in two instances. In old persons, this symptom is often observed in slighter degrees, and is attended by dryness of the meatus. This variety of deafness is generally ameliorated by warm or mild weather; and by loud noises; but, as soon as these cease, the affection returns to its former state. — It is caused, as well as aggravated, by mental exertion and fatigue; by masturbation, venereal excesses, and other depressants; by exposure to cold, currents of air, and humidity; and by the depressing passions. Its accession is imperceptible, and its progress very slow. Sometimes it continues long stationary; but it is little influenced by treatment. If the patient, however, be not far advanced in life, some advantage may be derived from blisters applied behind the ears, or from moxas, rubefacients, or stimulants, around the organ, and repeated from time to time; from the vapour of ether, or of camphor, conveyed into the meatus, or into the Eustachian tube; from tonics, with serpentaria, or arnica;

and from the preparations of iron. Electricity and galvanism have been employed in this variety, but with little or no permanent benefit.

35. *f.* Deafness, in its more complete states, may also proceed from *organic changes in the acoustic nerves*. SYLVIVS found them, on dissection, remarkably atrophied; a state probably consequent upon prolonged inaction. ACKERMANN observed them indurated; and MORAGNI states that, in one case, they were entirely wanting.

36. *C. Deafness from Plethora.* — *a.* Congestion of the vessels of the head or of the ear is not infrequently productive of deafness; and this congestion may either be purely local, or connected with a state of general plethora. In cases of this kind, the patient complains of headach, vertigo, throbbing noises in the ears or head, or momentary unconsciousness; which are increased by warmth, by a stimulating regimen, and the horizontal position. This form of affection is most common early in life, and again at middle age, or soon after; and especially in those who are subject to hæmorrhoids unattended by discharge, and in females who have experienced an interruption of the catamenia, or in whom this evacuation has ceased. The strictly local state of the affection may follow suppressed evacuations of various kinds, or repelled eruptions, or even retrocedent gout; and modifications of it are occasionally met with in connection with secondary syphilis, and with herpetic or other chronic eruptions.

37. *b.* The Treatment should in great measure depend upon the existence of local plethora or congestion only, or upon this state being associated with general plethora. The pathologist will generally decide correctly in these cases: but when the affection has followed the disappearance of accustomed sanguineous or other discharges or evacuations, spontaneous or artificial; and when the pulse, habit of body, and temperament, indicate vascular fulness; then general Palletting, repeated according to circumstances, local depletions, purgatives, and Periodic derivatives, low diet, and regular exercise will generally restore the hearing, if they be judiciously prescribed, and rigorously pursued. Deafness, however, from local plethora, and especially from congestion of the vessels of the organ, is not so easily remedied; and, when remedied, is liable to return. Local depletions, either from the vicinity of the organ, or from the anus, when there is a tendency to hæmorrhoids; blisters applied on the nape, and kept long open, or preferably issues or setons; decocturent purgatives or aperients, regularly and long persisted in; the warm or vapour bath; and other means calculated to promote the cutaneous functions, and prevent them from being interrupted, will be most serviceable for this form of the affection. If it have followed the suppression or disappearance of some eruption, discharge, or external affection, derivatives to the extremities, &c., sinapisms, blisters, &c., should be resorted to. If it have occurred in connection with secondary syphilis, a mercurial course will remove it, unless organic lesion of the Eustachian tube, or in the cavity of the tympanum, &c., have taken place. When it is associated with herpetic, or other chronic eruptions on the skin, the same internal and external means which succeed in removing

these, will also generally improve the hearing; especially alteratives, purgatives, diaphoretics, sulphureous, fumigating, and other medicated baths, and strict attention to diet, and to appropriate means for improving the digestive, the assimilating, and the excreting functions.

38. *IV. DEAFNESS AND DUMBNESS* most commonly proceed from acute or chronic *otitis*, in early infancy, giving rise to organic changes in the delicate and complex structure of the ear, especially in the labyrinth, and in the acoustic nerves; or from diseased changes near the origin, or in the course, of these nerves. — When deafness is *congenital*, one or other of these lesions may be inferred to have taken place in the fœtus; or the organ, or nerves of hearing, may be considered as having been imperfectly developed in some of their parts. Deafness and dumbness are very seldom remedied, and never if the deafness has been congenital. If the affection has arisen in infancy from disease of the ear, then the treatment may be carefully directed to the removal of the morbid conditions which that disease may be presumed to have occasioned; but the utmost attention must be paid to the history of the case, to the existing state of the organ and of the constitution, and especially to the phenomena connected with the brain and digestive organs. Cases of this kind are rarely treated with success; but, for this very reason, they should be placed under the care of a scientific medical practitioner, and be treated according to general principles, directed to the particular lesions of the organ, and to the pathological states of the system. That these cases ought not to be despaired of, is proved by the instances of success detailed by M. ITARD, in an instructive chapter on the subject.

39. *V. OF CERTAIN REMEDIES RECOMMENDED FOR IMPAIRED OR LOST HEARING.* — With a desire of restoring the affections of the ear to the care of the regular practitioner, from whom the pretensions and advertising assiduities of empirics have almost entirely removed them, I shall next take a brief survey of the principal remedies employed in the treatment of these affections. And here I may remark, that none but well educated medical men, pursuing other branches of practice, should undertake the management of these disorders; for they, only, are capable of ascertaining the various pathological conditions of which deafness is either an immediate, or a remote and indirect, consequence, and of appropriately prescribing means of cure — of employing these means without risk of injury to the function, or to the organ, or even to the brain, with which the organ is so intimately connected.

40. *A. Constitutional Mean* — *a. Vascular depletions*, general or local, are necessary when inflammatory action, or general or local plethora, is present. In other circumstances they are inadmissible. — *b. Purgatives* are required in similar states; and when deafness is associated with disorder of any of the digestive organs, and with costiveness. They were much praised by DIEMERBROECK, HOFFMANN, and FAER. — They are injurious in purely nervous deafness, unless conjoined with stomachics and tonics. — *c. Emetics* have been recommended by SWÖTZ, LAVAUZ, and KENNEDY; and are sometimes of service when the hearing is impaired by inflam-

mation of the ear, or by collections of mucus in the guttural extremity of the Eustachian tube, or when the affection is connected with deficient action of the biliary apparatus. In nervous deafness, they are useless, and, when congestion of the brain is present, they may be injurious.

d. Tonics and stimulants, especially the preparations of cinchona, of cascarrilla, of iron, of serpentaria, of arnica, of camphor, of ammonia, the ethers, &c., have been very generally resorted to in nervous deafness, and sometimes with benefit, when judiciously employed. — *e. Alteratives and deobstruents*, especially *mercurials* and *iodine*, or a combination of them, may be severally prescribed when the deafness is dependent upon secondary syphilis, or upon constitutional vice, or is connected with chronic cutaneous eruptions. They may also be tried when thickening of the membranes of the ear, or of the Eustachian tube, or obstructions of the latter by mucus, are supposed to exist. — *f. Salivation* was recommended by DESAULT and ETTMÜLLER, but is requisite only when the affection proceeds from venereal ulceration in the vicinity of the organ. — *g. The preparations of squills* internally have been advised by LANGE, when the Eustachian tube is obstructed by mucus; and a course of *dulcamara* by CARRÈRE, when deafness is associated with herpetic eruptions. *Sulphur* and the balsam of sulphur may be prescribed, as directed by RULAND, in these or similar circumstances.

41. *B. Of Local Remedies.* — *a. Of these* the most vaunted are *electricity*, *galvanism*, and *mineral magnetism* — but chiefly by those who are adepts in these departments of quackery. The intuity of, and even occasional risk from, these means have been shown by HALLER, DE HAEN, ZEITEL, FRESE, and TREVIANUS. Dr. KRAMER has examined the proofs as to the efficacy of *electricity* in deafness furnished by the most respectable of those who have written upon the subject; and has shown that not one case can be said to have been cured, although many have been made worse by it. The opinions of ITARD and DELKAU nearly coincide with those of Dr. KRAMER. Many cases have been published as cures by *galvanism* and *mineral magnetism*; but the improvement, said to have occurred, has continued only as long as the excitement occasioned by the employment of these agents. In most cases, however, no benefit has been derived from them, or it has been apparent only, or has existed merely in the patient's imagination. In two or three instances, patients have conceived their hearing to have been somewhat improved by *galvanism*; but I have observed, that this sense has nevertheless become more and more impaired.

42. *b. Moras* have been praised by PAROISE, LODER, and ITARD. Dr. KRAMER is not favourable to them; but the testimony of a person who has a favourite remedy of his own, and finds fault with nearly all other means, should be received with reservation. M. ITARD, whose experience and opinion are equal to those of Dr. KRAMER, are in favour of them, in the cases in which they have been prescribed above. — *c. Issues and setons* have been employed by ZACUTUS LUSITANUS, ETTMÜLLER, ITARD, and others, as derivative means. They should be inserted in the nape, or in the arm, in those

states of the affection for which they have been already recommended. They will often prove inefficacious, or even injurious, if resorted to inappropriately; and especially in cases of idiopathic palsy of the acoustic nerves; or in old, enfeebled persons; or when the deafness has been caused by exhausting or depressing causes. — *d. Blisters*, applied behind and below the ears, and often repeated, or kept open, have been praised by RIEDLIN, LAVAUD, STÖRCK, WENDT, ITARD, and others. Dr. KRAMER considers that they, as well as the *tartar emetic ointment*, are indicated only in circumscribed inflammation of the auditory passage and *membrana tympani*. He prefers the ointment, which he rubs below the mastoid process, to avoid injuring this part. These means, however, admit of a more general application than he has allowed.

43. *C. — a. Masticatories* were prescribed in deafness by WEPFER, DIEMERBROECK, STAHL, and MORGAGNI; but they are now entirely neglected. Several states, however, of this affection admit of a trial being safely given to them. — *b. Gargles* are amongst the most useful means that can be resorted to in those states of the affection which originate in acute or chronic disease of the throat. And when it is considered how very often inflammations of the ear, and deafness, are caused by lesions of the Eustachian tube, proceeding from the throat and posterior nares, especially during the various forms of cynanche, and in the course of eruptive fevers, the importance of these means cannot be overrated. These applications should be suited to the nature of the affection of the throat: in the more sthenic states of inflammatory action, they should be refrigerant, and contain the nitrate of potash, or hydrochlorate of ammonia, or borax; in the more asthenic forms of affection they may be astringent, tonic, and stimulant, and may also contain either of these, or some other, detergent substances. — When the occlusion of the guttural extremity of the Eustachian tube with mucus is suspected, these salts, especially the last, will be of service; and, when the deafness is measure nervous, the tincture of cayenne may be added to these, or to any other form of gargle that may be preferred. — In deafness connected with secondary syphilis (§20.), the bichloride of mercury will be employed, in the form of gargle, with advantage.

44. *D. Drops and Injections*, especially those of a spirituous, irritating, or acrid nature, into the auditory passage, are justly considered by ITARD and KRAMER to be injurious. But various stimulating or rubefacient applications about or below the ear, as garlic, onions, rue, &c., have, according to HOFFMANN, MÜLLER, and others, sometimes been resorted to with advantage in nervous deafness. Dr. TURNBULL recommends ointments with either *veratrina*, *delphinæa*, or *aconitine*, to be rubbed around the ear daily; or four or five drops of a spirituous solution of either of these (gr. ij — iv. to ʒss. of spirit) to be dropped into the ear. — *Of perforation of the membrane of the drum*, notice has been already taken. Its want of utility, and the circumstance of its readily cicatrizing, have been pointed out by HUFELAND, NAESE, MAUNOIR, ITARD, and KRAMER. — *Douches of vapour* or of water were formerly used in several affections of the ear,

BARTHOLIN, HOFMANN, and MICHAËLIS, advised warm vapours, containing various stimulating substances, as camphor, æther, &c., to be directed into the meatus. These, however, require much caution and discrimination; but they may sometimes be of service, especially in catarrhal affections of the ear, and in idiopathic nervous deafness. **Dr. KRAMER** undervalues these and other means, in order to enhance his own remedy (§ 45.).

45. *E. Injections into the Eustachian tube* were first recommended by **GUIZOR**; but **CLELAND**, in 1731, first proposed them in a practicable mode, namely, by the nose; and **WATHEN** long afterwards proved that a favourable result might be obtained from the practice. The injection of fluids into the tube was advised by **BUSSON** and others, to be performed by filling the mouth with the fluid; and, having firmly closed the lips and nose, by forcing it into the tube.—**Air** has also been directed to be forced into the tube, by **CLELAND** and **SMs**, in the same way, in order to remove obstructions of it; and the smoke of tobacco has been similarly used, with the intention both of removing obstruction, and of exciting the organ, in nervous deafness, but with very equivocal results: I know one instance in which it proved decidedly injurious. Injections of medicated fluids, of vapour, and of air, into the Eustachian tube, by means of a suitable apparatus, have been severally resorted to by **IRARD**, **DELEAU**, and **KRAMER**.—Besides injecting air as a means of diagnosis, **Dr. KRAMER** throws into the tube, through a catheter introduced into it, the vapour of *acetous æther*, generated in a proper apparatus, at a summer temperature; but confines the practice to cases of nervous deafness characterised by torpor, or those unattended by noise in the ear. He also aids the local means by remedies intended to improve the constitution, and the digestive and other functions.

46. *F. Russian Vapour Baths* have been much recommended in deafness, especially when it has been supposed to originate in exposure to cold; general, or fumigating, or sulphur baths, have also been employed in these and other circumstances of the affection. They may all prove injurious in cases connected with congestion in the head or ears, or with general plethora. They are most serviceable when constitutional complaints—especially chronic cutaneous eruptions, or an obstinately harsh and unperspirable state of the general surface—are associated with the deafness; this latter probably depending in part upon a somewhat similar state of the ears to that of the skin and general system. In these cases they should be cautiously employed, vascular determinations to the head or to the ears having been previously removed, and morbid secretions and excretions freely evacuated.

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HEART AND PERICARDIUM—DISEASES OF THE.—**SYN.** *Kardia*, *Χαρ*, *Χαρ*, *Gr. Cor*, *Lat. Das Herz*, *Germ. Cœur*, *Fr. Cœur*, *Ital. Pericardion*, *Gr. Pericardium* (from *peri*, around, and *kardia*, the heart). *Péricarde*, *Fr. Der Herzbeutel*, *Germ. Pericardio*, *Ital.*

I. I. INTRODUCTORY REMARKS.—The progress that has been made in the knowledge of the diseases of the heart, may be dated from the appearance of the writings of **HARTENFELS**, **BONET**, **VILVUSSEUX**, **LANCISI**, and **BARNEYRAC**, towards the close of the seventeenth, and at the commencement of the eighteenth, century. **LANCISI** first directed attention to lesions of the valves, and to hypertrophy, of the heart, as causes of sudden death. **MORGAGNI**, **SENAC**, **MICKEL**, **JUNCKER**, and **SPAVANTI**, further advanced our knowledge of these diseases; but, from the middle of the last century, when the work of the last-named writer appeared, until the beginning of the present, when **CORVISART** wrote, this department of pathology was completely neglected. With **CORVISART**, the recent progress that has been made in it may be said to have commenced. His work was soon followed by that of **A. BURNS**, by the engravings of **BAILLIE**, and by the fragment of **FARRIS**, in this country; and by the works of **I. WARREN**, in North America; of **TESTA**, in Italy; of **KREYSIG**, in Germany; and of **BERTIN** and **LAUNNÉC**, in France. Still more recently, the publications of **LOUIS**, **ANDRAL**, **WILLIAMS**, **ELLIOTSON**, **HOPK**, **STOKES**, **WATSON**, **LATHAM**, **CORRIGAN**, **BOUILLAUD**, and the con-

tributions of many others, have further enriched this department of our science.

2. *i. Of certain Topics relative to the Structure and Actions of the Heart in Health, &c.*

—*a.* The layers of muscular fibres, and their various and tortuous directions, in the different compartments of the heart, require not particular notice here. According to M. GENDY, these layers amount to six in the left ventricle, and only to three in the right; in both auricles, there are two in each. The muscular tissue of the right auricle is less abundant than that of the left, and leaves minute intervals between its fibres, allowing the external and internal membranes to come in almost immediate contact. To this circumstance M. BOUILLAUD imputes the frequent association of inflammations of these membranes. The muscular fibres of the heart are more distinct in the fetus than in the adult; this organ only participates in the general paleness of muscles at that epoch, although it is deeper coloured than they. It is also entirely without fat at this period. In corpulent persons, the external layers of muscular fibres, especially at the base, are covered with fat; which sometimes presents a watery or gelatinous appearance in the cachectic or leucophlegmatic. In old age, the texture of the heart becomes soft and flaccid, and the parietes of the cavities thin. The cavities themselves enlarge, especially the right; and the surface of the organ is charged with fat. —The *chordæ tendineæ*, the whitish *zonæ* at the base of the valves forming the contour of the orifices, and the *interior of the valves* themselves, are principally formed of fibrous or albuginous tissue, which often becomes, especially in the latter situation, the seat of serious lesions, particularly in persons advanced in life.

3. *b.* The *internal surfaces* of the heart, as well as the parts just named, are covered by a transparent, pellucid, and whitish membrane, resembling the most attenuated serous membranes. It is more delicate in the right than in the left cavities; and the least so in the auriculo-ventricular and arterial orifices. It is readily stained by the colouring matter of the blood, owing to imbibition during certain states of this fluid. It is perfectly smooth and polished; but, in the situation of the orifices, where it is thickest, it often becomes rough or uneven, from chronic inflammation, which most frequently occurs in these parts, and in the valves. It is connected to the fibrous and muscular tissues by a fine cellular substance, which often is thickened or otherwise altered by disease. —This membrane has been appropriately called the *Endocardium* (from *ἔνδω*, within, and *καρδία*, the heart) by M. BOUILLAUD. — It adheres so firmly to the adjoining tissues, that it can be detached only in small pieces; but, in certain diseases, it can be removed in large shreds. At the base of the valves, where the two layers of this membrane separate to receive the tendinous rings bordering the orifices, the *endocardium* and *pericardium* are nearly in contact with each other, or are connected merely by a fine layer of cellular tissue. This state of structure, and its connection with the inclosed fibrous tissue, explain both the frequent coexistence of internal and external inflammation of the heart, and the intimate connection often existing between these inflammations and rheum-

atism. — *c.* Of the *pericardium* it is unnecessary to say more than that it is a serous membrane, forming, as in all other situations, a shut cavity, reflected over the heart, and origin of the large vessels, and over the fibrous bag inclosing this organ. Its free surface is polished, smooth, and bedewed by an exhalation preventing friction, and the production of any sound; but, when it is diseased, morbid sounds, as well as other plegmomena, result.

4. *d.* The *nerves* of the heart have been a subject of interest with pathologists. They are derived chiefly from the ganglia of the great sympathetic, a few only coming from the pneumogastric; but these latter seem rather to inoculate or communicate with the plexuses of the former, than to directly supply the texture of the organ. The cardiac ganglion seems more particularly to preside over the actions of the heart, or to re-enforce with additional energy whatever it may receive from other sources, especially from the centre of the ganglial system, and the other ganglia in the neck and chest. These nerves supply the substance of the heart in two ways: — 1st. There are numerous branches which proceed from plexuses directly to the muscular texture, and which, dipping between the fibres, give off minute fibrillæ to the muscular fibres next to them in their descent into the substance of the heart; — 2d. A large portion of the cardiac nerves form a reticulum around the coronary arteries. A part of these follow the arteries to their distributions; but before these arteries are ramified minutely, a part of the nerves surrounding them is detached to adjoining tissues, so that *all* the nerves reticulated around the coronary arteries do not accompany them to their ultimate distributions or terminations.

5. *A.* The *Actions of the Heart* may reasonably be referred chiefly to the influence which the ganglial nervous system bestows on the muscular structure of the organ. — HALLER attributed them to *irritability*, or a peculiar power inherent in the muscular fibres themselves. But I have contended in several publications, since 1820, that the ganglial system is the source of irritability; and the same view has been more recently adopted, and ably supported, by Dr. ELEUTHER. The experiments of WILLIS, HOMS, W. PHILIP, CLIFT, BRACHET, and others, show, that the actions of the heart are independent of the cerebro-spinal nervous power, although they are influenced by it. In experiments, which I performed, in 1818, on several species of fish, the heart continued to contract, not only after the destruction of the cerebro-spinal axis, but even for some time after it was removed from the body. Cases, also, have been observed by LALLEMAND, LAWRENCE, and others, of the absence of both the brain and the spinal chord, and yet the circulation continued for a considerable time after birth. An instance very nearly of this kind has very recently been observed by my colleague DR. SWEATMAN. HUMBOLDT found that the contractions of the heart, even after the removal of it from the chest, were more frequent and forcible, upon the application of the galvanic current to one of the cardiac nerves; and HOMS and WEINHOLD obtained nearly similar results from their experiments. In 1820, I repeated these experiments, and the phenomena were the

same as observed by these physiologists. The more recent researches of M. BRACHET show the justness of my views as to the dependence of the heart's action upon the ganglial system, and which were published twelve years before the appearance of his work upon this system. In my publications on this subject, it has been further contended, that irritability does not exist as an independent principle, but as one of the vital manifestations of this system, exerted through the medium of muscular or fibrous tissues.

6. B. Such, therefore, being the source of the heart's action, the chief seat of action requires some notice.—I believe that too much importance has been attached to the auricles, in estimating the motions of the heart; and that the contractile force of these compartments is much less than is supposed. From some experiments I performed about twenty years ago, I concluded that the actions of the heart should be referred chiefly to the ventricles, and agreed with HAMMERCER in allowing them a dilating power; but considered that Dr. CANSON pushed this opinion too far. I further observed, that if the dilatation of the ventricles were a result of a relaxation of their parietes merely, the cavities would not be so quickly and perfectly filled by the mechanical pressure of the blood as they are; and dilatation would be only the consequence of this pressure, and be proportionate to it. But such is not the case; for, on close observation, the dilatation always appears as the cause of the flow of blood. The opinion of M. BOUILLAUD nearly agrees with the above inferences, published by me in 1824. He, however, considers the injecting powers of the auricles to contribute to the dilatation of the ventricles, and attaches too much importance to the elasticity of their muscular parietes in aiding this action. If the contractions of the auricles were as energetic as commonly believed, a valvular apparatus would have existed between them and the roots of the large veins. The actions of the ventricles should, therefore, be viewed in the double light of *energetic contraction*; *active dilatation*; by means of the blood is propelled along the arteries, and the aid of the latter, it is drawn into the ventricles; into the auricles, a current from the smaller veins being thus kept up towards the heart. (See *Notes and Appendix to M. RICHERAND's Elements of Physiology, &c.*, by the Author.)

7. ii. *Of the Weight and Dimensions of the Heart in Health and Disease.*—A. It is obvious that no precise idea can be formed as to atrophy and enlargement of this organ, without having previously determined the dimensions and weight of it in health. This M. BOUILLAUD has endeavoured to ascertain. The following results are abstracts of his researches, and are given in the French weights and measures. He considers that the common opinion of the closed hand being the size of the heart of the same person is very nearly the truth; and that the opinions of CROVILLIER and LONSTEIN as to the weight and size of the healthy organ are neither precise nor correct. In fourteen cases—(a) The heart's medium weight was 8 oz., 3 dr. (9 oz. 4 dr.), the greatest being 11 oz., and the least 6 oz. 2 dr., but its weight varies with the size of the person: it also is less in females than in males.

The heart cannot be said to have arrived at its full development until 24 or 25 years of age.—(b) The medium circumference of the heart, at the base of the ventricles, was 8 inches 9 lines, the least being 8 inches, the greatest being 10 inches 6 lines.—(c) The medium thickness of the walls of the left ventricle was $6\frac{1}{2}$ lines, the maximum being 8, and the minimum 5 lines. The medium thickness of the parietes of the right ventricle was $2\frac{1}{2}$ lines, the maximum being $3\frac{1}{2}$, the minimum $1\frac{1}{2}$ line. The interventricular partition was 7 lines in thickness. The medium thickness of the parietes of the left auricle was $1\frac{1}{2}$ line; that of the right, 1 line.—(d) M. BOUILLAUD confirms the statement of LEONALLOIS, that the medium capacity of the right ventricle is somewhat greater than that of the left; and that of the right auricle greater than that of the left.—(e) The circumference of the left auriculo-ventricular orifice is about 3 inches 6 lines; that of the right, 3 inches 10 lines; that of the ventriculo-aortic orifice, 2 inches $5\frac{1}{2}$ lines; and that of the ventriculo-pulmonary orifice, 2 inches $7\frac{1}{2}$ lines.

8. B. Of seven cases of atrophy of the heart—(a) The medium weight was 175 grammes (or scruples = 7 oz. 2 dr. Eng.); the maximum being 200, the minimum 135 grammes.—(b) The different compartments of the organ, in a state of atrophy, generally preserve their relative dimensions. Sometimes, however, the parietes of the ventricles retain their usual thickness, chiefly from contracting on themselves and diminishing their capacity. In atrophy, also, the mean weight of the organ may be much lessened, whilst the dimensions of the whole, or of certain compartments of it, may not be sensibly, or may be only slightly, diminished.

9. C. In hypertrophy of the heart—(a) The mean weight of thirteen cases was 473 grammes (scruples) 5 grains; the maximum being 688, the minimum 338 grammes.—(b) The mean circumference of the organ was 11 inches 10 $\frac{1}{2}$ lines, the maximum being 12 inches, and the minimum 8 inches 10 lines.—(c) The mean thickness of the left ventricle was $10\frac{1}{2}$ lines, the maximum being 1 inch 1 line, the minimum 7 lines.—(d) The mean thickness of the right was $3\frac{1}{2}$ lines; the maximum being $4\frac{1}{2}$, the minimum 3 lines. The mean thickness of the left and right auricles was $2\frac{1}{2}$ lines, and $2\frac{1}{2}$ lines respectively,—that of the interventricular partition being $9\frac{1}{2}$ lines.—(e) The capacity of the left ventricle was generally more or less increased; that of the right was also increased in one third of the cases. In three instances the capacity of the ventricles was diminished.—(f) The circumference of the left auriculo-ventricular orifice was increased in three cases, in one of them to 4 inches 3 lines; that of the right was augmented in five instances, in one of which it reached 5 inches 9 lines; and that of the ventriculo-pulmonary orifice was increased also in five, and reached in one 3 inches 6 lines.

10. iii. *Of the Sounds of the Heart.*—In the article on AUSCULTATION, I stated the received opinions as to the sounds of this organ, and remarked that the subject required further investigation. Since that time, several able inquirers have entered upon it, and may be said to have settled the question. HARVEY and

HALLER described the contractions of the auricles as preceding those of the ventricles. This, the true view of the matter, was departed from by LAENNEC, who conceived that the contractions of the auricles followed those of the ventricles. The researches of TURNER, CORRIGAN, WILLIAMS, HOPE, and BOUILLAUD, have shown the inaccuracy of LAENNEC'S opinion. Dr. WILLIAMS, especially, has assiduously investigated this subject; and, as his inferences have been upon the whole confirmed by the committees of the British Association, I shall follow him chiefly in the few remarks which remain to be made respecting it.—1st. The contraction of the ventricles, following immediately that of the auricles, is accompanied by the *first* or *dull sound*. This *systole*, by straightening the anterior convexity of the ventricles, brings the apex of the heart into forcible contact with the ribs, and thus produces the *impulse* or *shock*. The *systole*, by throwing an additional quantity of blood into the arteries, causes the arterial pulse, which is synchronous with the *systole* in arteries near the heart; but, in those more distant, succeeds it at an interval occupied by the transmission of the wave through the blood along the elastic tubes from the heart.—2d. The *systole* of the ventricles is immediately followed by the *diastole*, which is attended by the *second* or *short sound*.—3d. There is afterwards an interval of *rest*, at the conclusion of which the auricles contract, and the series of motions is repeated as before. The points which here remain to be settled are—(a) the way in which the *systole* of the ventricles produces the first sound; and (b) how the *diastole* causes the second.

11. The *first sound* was ascribed, by Mr. CARLILE, to the rush of blood into the great arteries; by M. ROUANET and others, to the closing of the auriculo-ventricular valves; by Dr. HOPE, to the collision of the particles of fluid in the ventricles; and by Dr. WILLIAMS, to the muscular contraction itself.—The *second* or *short sound* was ascribed, by Dr. HOPE, to the impulse of the blood from the auricles refilling the ventricles; by CARSWELL, ROUANET, CARLILE, BOUILLAUD, and others, to the suction of the ventricles causing the elevation of the sigmoid valves, and to the reaction of the arterial columns of blood against these valves. The experiments performed by Dr. WILLIAMS, assisted by Dr. HOPE and several other able physiologists, in order to determine these points, proved, that the *first sound* is produced by the muscular contraction of the ventricles; and that the *second sound* is caused by the reaction of the arterial columns of blood tightening the semilunar valves at the diastoles of the ventricles.—Dr. WILLIAMS, Dr. HOPE, and M. BOUILLAUD, concur in considering the *impulse* or stroke of the heart to be effected by the apex alone; whilst the experiments of the Dublin Committee seem to show that the body of the ventricle is also concerned in producing it. The London Committee admit that the first sound is caused by muscular tension, but think that the impulse may be an accessory. In other respects they all tolerably agree.

12. *iv. The morbid Actions and Sounds of the Heart* have been very fully considered in the article *AUSCULTATION* (§ 25.). Little, there-

fore, remains to be noticed respecting them at this place, beyond a brief mention of the views of some writers of eminence that have appeared since that article was published.—A. As may be expected, *a priori*, the duration of the *systole* seems often to be prolonged by the difficulty experienced by the blood in passing through the morbid arterial orifices. Continued and violent palpitations, particularly in cases of hypertrophy, tend eventually, according to the observations of M. BOUILLAUD, to produce marked prominence of the præcordial region. I have remarked this, also, in cases of sub-acute and chronic pericarditis. In a case of pericarditis, complicated with rheumatism of the joints, in a child seven years of age, who was long under my care, this prominence and the palpitations were remarkable; but, after a time, these disappeared, and the lower half of the sternum, with the cartilages of the ribs, became drawn inwards, and towards the spine, to such an extent as to form a very remarkable cavity in the præcordial region. This occurrence was so singular, that I caused the patient to be shown to several of my colleagues at the Middlesex Hospital. It appeared to have arisen from adhesion of the pericardium to the heart, and from the subsequent atrophy of the latter.

13. B. The *intensity of the sounds*, as well as of the impulse of the heart, varies remarkably.—In some instances the sounds are feeble, and heard with difficulty; whilst in others they are heard at a distance of two or three feet. Although the impulse against the ribs does not produce either of the natural sounds, yet, in violent action of the heart, the more sudden and abrupt strokes cause a sound, constituting the termination of the first sound in these cases, and which seems nearer the ear, and more like a knock, than what is heard in the ordinary action of the heart. The sounds may assume a dry or hard character, which BOUILLAUD imputes, but I think incorrectly, to hypertrophy and rigidity of the mitral valve; or they may be large, hoarse, or rough, owing, as he thinks, to a fungoid or inflamed condition of the valves, which are then flaccid.—The *saw sound* sometimes has a *hissing* character, and at other times a *rough tone*; but all these are more or less connected with narrowing of the orifices of the compartments. LAENNEC considered them to proceed from spasm, of the existence of which, however, we have no satisfactory proof.—A sound, which varies in tone from the *crowing* of a dove to the *chirping* of birds, or the *sibilous* noise of bronchitis, is more rarely heard: I have heard it only twice. It has also been noticed by M. BOUILLAUD, ROUANET, and, I believe, by Dr. WATSON. It seems connected with narrowing of the orifices. I heard it in a case of rheumatic pericarditis in a child.—The *bellows*, or *blowing sound*, M. BOUILLAUD asserts, has been heard in upwards of a hundred cases, where contraction of the orifices, with induration of the valves, was established by dissection; whilst M. PLOMAY states, that his experience is at variance with this result. An able reviewer (*Brit. and For. Med. Rev.* No. ii. p. 451.) very justly remarks, that, although cases of well-marked contraction, with ossifications, &c., do present themselves, unaccom-

panied by any such abnormal sounds, such occurrences are extremely rare, and form only the exception, and not the rule, as M. Piorry would have them to do. It should also be kept in mind that the morbid sounds may be produced by a reflux, as well as by an onward, motion of the blood, as M. Filhos has contended.

14. M. BOUILLAUD considers that the *bellows sound* may proceed from—1. Narrowing of the orifices, with induration of the valves;—2. Smallness of the aortic orifice, although the valves are quite healthy;—3. Polypous exudations, resulting from acute inflammation of the endocardium;—4. Irregularity or roughness of the surface of the valves, or vegetations, or calcareous incrustations on them;—5. Infiltration of the valves from inflammation;—6. Adhesions of the auriculo-ventricular valves to the adjacent parietes;—7. Dilatation of one or more of the heart's orifices, with consequent inefficiency of the valves;—8. Hypertrophy, with dilatation of the left ventricle; although unattended by narrowing of the orifices;—9. Chlorosis, anæmia, and nervous affections of the heart, in some instances;—10. Extreme debility from hæmorrhage, or other depressing causes. It has been supposed that the bellows sound, which is not constant, or is only occasional, in the three last circumstances may arise from spasm. M. BOUILLAUD believes it to depend in these on a narrowing of the orifices, to adapt themselves to the diminished quantity of blood circulating through them. He further considers that all the above cases are reducible to one common principle, namely, increased friction produced in some of them by the direct, in others by the reflux, current of the blood; but most frequently from the former cause. From this it is evident—and most experienced practitioners must have arrived at the same conclusions, from their own observations—that it is impossible to decide, from the bellows sound alone, in which of the orifices, if in any, the lesion is seated. The co-existence of this sound with the systole or diastole, and the situation in which it is loudest, may assist the observer, but still no accurate conclusion can be arrived at as to its precise cause.—When the *whistling* or *rasping sound* is heard, the alteration may be supposed to partake more or less of an osseous character.

15. C. The sounds produced occasionally by the surfaces of the pericardium in a state of disease, were overlooked by LAENNEC, and have only recently received attention. It is chiefly to COLLIN, REYNAUD, HUNORÉ, STOKES, WILLIAMS, MAYNE, and BOUILLAUD that we are indebted for observations respecting them. M. BOUILLAUD divides these sounds into three varieties.—1st. The *rubbing sound*, resembles that caused by rubbing together two pieces of silk, or of parchment. It is to be distinguished from a similar sound produced by the pleura, by its being double and synchronous with the heart's action. It is most obvious in the systole, and is diffused over a considerable surface.—2d. The *creaking sound*, is altogether similar to the creaking of leather, or of shoes, or of a saddle. M. BOUILLAUD remarked it once; M. ANDRAL only once, and Dr. WILLIAMS in three cases. M. COLLIN and others have also heard it. I have met with it in two instances: one of them a boy, about ten years of age; the other a young lady of about

twenty, who, in 1833, came from Brompton to consult me. She had, several months previously, experienced an attack of acute pericarditis; and, whilst describing her symptoms to me, she herself likened the morbid sound she heard in the præcordial region to the creaking of new shoes. I heard it distinctly with the unassisted ear.—3d. The *scraping sound*, is such as may be expected to be produced by rubbing a rough and hard cartilaginous or osseous body against the pericardium. Its synchronism with the motions of the heart distinguishes it from similar morbid sounds originating in the pleura. M. BOUILLAUD states, that the two first sounds occur only in acute pericarditis. In the two instances I met with, there had existed the acute form of this disease; but it had long before subsided, leaving after it organic lesion, or at most a chronic state of inflammation. The friction, or rubbing sound, in its faintest states, occurs in the early stages of acute pericarditis, and whilst the membrane is dry. The creaking or leathery sound seems to arise from thickening or condensation of the subserous and serous tissues of the pericardium, especially of the portion reflected over the heart; and the formation of a dense and elastic false membrane, with, perhaps, more or less adhesion of the opposite surfaces. The scraping or grating sound is caused by lesions which occur only in the more protracted cases of chronic pericarditis.—When the bellows sound is heard in pericarditis, it does not necessarily depend upon this disease, but rather upon the coexistence of inflammatory action in the internal membrane of the heart, or the extension of it to the fibrous structure of the orifices or of the valves, and the consequent contraction or other lesions thereby occasioned.

16. v. *Percussion of the Cardiac Region* is best performed with the index finger of the unemployed hand as the medium, or plessimeter. In the healthy state, the extent of the dull sound generally varies from an inch and a half to two inches square, which answers precisely to the extent to which the heart is disengaged from the lungs. The extent of the dullness increases very much in hypertrophy of the organ with or without dilatation of the cavities, in simple dilatations, and in congestions of them occurring in various diseases. It is not unusual to find the dullness, in these circumstances, extending to five or six inches square. (See art. AUSCULTATION.)

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II. A GENERAL VIEW OF DISEASES OF THE HEART. — SYN. *Kardiaí νόσοι*, Gr.; *Cordis Morbi*, Lat.; *Herskrankheiten*, Germ.; *Maladies du Cœur*, Fr.; *Malattie del Cuore*, Ital.; *Diseases of the Heart*, Heart-Diseases.

17. As the various maladies of the heart frequently proceed from the same causes, often are met with in similar states of complication or association, admit often of the same prognosis, and even frequently require the same modes of treatment, I shall, in order chiefly to prevent repetitions, take a general view of them before I proceed to consider their specific forms.

18. i. The *Causes of Diseases of the Heart* are even more diversified than was supposed by CORVISANT and some other writers. — A. The *Predisposing Causes* are nearly the same as those concerned in producing inflammatory and nervous diseases in other organs; but the unceasing actions, and the intimate sympathies, of this viscus, not only increase the general predisposition, but also serve to impart a peculiar character to the effects more immediately produced on it by numerous physical agents and moral influences. — The irritable, nervous, and sanguineous temperaments; a plethoric habit of body; the rheumatic and gouty diathesis; depression of mind; and the peripetral states, favour more or less the occurrence of diseases of the heart. LANCISI, ALBERTINI, SENAC, MORGAGNI, CORVISANT, BOUILLAUD, and others, have remarked an hereditary predisposition to these diseases, independently even of either of the diatheses just particularised. Besides these, susceptibility of the nervous system, whether original or acquired; and pre-existent disorder, especially debility in its various forms; impaired digestive, excreting, and assimilating powers; morbid states of the blood, affections of the lungs and liver, and irritations of the uterus and spinal chord, predispose more or less to these maladies.

19. B. The *Exciting Causes* may be arranged into — 1st. The Mechanical and Traumatic; — 2d. The Physical; — 3d. The Moral; — and, 4th. The Pathological. — a. Under the first of these may be arranged blows, falls, wounds, and external injuries, directly or mediately affecting the organ; compression of the ribs or sternum, or of the hypochondria, by resting against a desk, and by strait lacing; and over-distension of the stomach by food or drink. — b. Amongst the *physical causes*, may be enumerated — great muscular exertion, especially while the breath is retained; long journeys on foot, and fatigue; running against the wind, or ascending eminences or stairs; reading or speaking aloud, and singing, especially if long continued, or when empasioned; blowing wind instruments; straining at stool; advanced pregnancy; excessive venereal indulgences; the abuse of spirituous or fermented liquors; arsenical preparations in poisonous doses, or employed too long or in too large doses as a

medicine; the injudicious use of other acrid substances; exposure to cold, or to cold and humidity conjoined, and to currents of cold air; wearing damp linen or clothes, or sleeping in damp beds or sheets; and drinking cold fluids, or eating ices when the body is perspiring. — c. The *moral causes* comprise all the depressing and exciting affections of mind, especially when excessive, but more particularly the former. Sudden shocks, fright, terror, violent fits of anger, anxiety, grief, sadness, nostalgia, amorous affections — all not merely affect the functions of the heart in a very remarkable manner, but sometimes also alter its structure.

20. d. The *pathological causes* are still more influential than the causes already enumerated; and act in different ways. — 1st. Some of them embarrass the actions of the heart, by impeding the functions of the diaphragm and lungs, as flatulent distension of the stomach or colon; enlargement of the liver, or of the spleen, and effusions of fluid in the large cavities. — 2d. Others obstruct the circulation through the lungs, and consequently cause congestion or distension of the heart's cavities, as asthma, whooping cough, pneumonia, bronchitis, convulsions, &c. — 3d. Certain pathological states extend to the heart or pericardium from other parts, owing either to proximity of situation, or to their structure being of the same kind as that of the parts previously affected. — Thus inflammation of the external or internal membrane, or other diseases, of the heart, appear in the course, or after the subsidence, of pneumonia, of pleuritis, of rheumatism, &c. — 4th. Some of these causes are connected with excessive vascular plethora, with or without a morbid condition of the circulating fluids, as the suppression of eruptions or discharges, and interrupted or impeded action of any of the principal assimilating and excreting organs. That the blood may become morbid, owing either to the imperfect assimilation and the injurious nature of the ingesta, or to the accumulation in it of the ultimate products and effete principles of assimilation requiring to be eliminated by the energetic action of the emunctories, and that this state of the blood may excite disease in some part of the heart's interior, seems more than probable. — The changes in the circulating fluids, moreover, taking place in the course of fevers, or in connection with the exanthemata, erysipelas, gout, &c., may also occasion disease of this organ; and it is not unreasonable to infer, that, when this connection is observed, as much is often owing to the morbid condition of the blood, as to that of the living solids. — 5th. In cases of suppression of gout or rheumatism, or the retrospulsion of the exanthemata, and of other acute cutaneous eruptions, it may be admitted, that whilst the constitutional disturbance, upon which the local or external affection depends, remains unabated, the suppression of the latter will very probably be followed by some prominent affection, or localisation of morbid action, in an internal organ, especially if the powers of life are inadequate to throw it off upon some external part; and as, in these diseases, the circulating fluids are more or less altered, and the actions of the heart already much disturbed, one or other of the tissues or compartments of this organ will be quite as likely to become the seat of the superinduced

malady, as any other internal part; and even more so, as respects rheumatism, owing to the predisposition arising out of identity or similarity of structure.—6th. One affection of the heart, functional or structural, may occasion another, or an additional lesion. Thus violent palpitations sometimes rupture a muscular column, or tendon, of the valves, or even the parietes of the heart itself; and narrowing of an orifice occasions dilatation of the cavity behind it, &c.

21. Whilst CORVISART and SCHINDLER have attached the greatest share of importance to moral causes in the production of cardiac diseases, and undervalued the influence of physical agents, M. BOUVILLAUD has over-estimated the latter, at the expense of the former; and they, as well as all other writers, have either entirely overlooked, or have scarcely adverted to, several of the antecedent changes, or pathological states, to which I have imputed so much in the causation of these maladies.

22. ii. *Of the Seat and Anatomical Characters of Diseases of the Heart.*—A. It is extremely rare, as M. BOUVILLAUD remarks, to find the heart altogether diseased: most commonly a compartment only, or a portion of it merely, or even one of the tissues constituting it, is affected. Sometimes one or more valves, or orifices, are primarily altered; and in other cases, either the internal or external membrane, or the muscular structure, is changed. In one instance, a cavity is dilated, and its walls thinned; in another, it is of natural capacity, but its parietes are remarkably thickened; and in others, the compartments individually present various lesions, as softening, hardening, &c.

23. B. *The intimate nature of the heart's lesions is not always evident, even on the most minute examination.* That they are frequently inflammatory, or of that kind usually so denominated, cannot admit of doubt; and that they still more frequently are the consequences of inflammation in some one or other of its grades, modified, however, by the tissue in which it is seated, by the state of vital power attending it, or by the condition of the circulating fluids, is equally true, although less manifest, than the former. Inflammation affecting a serous membrane gives rise to results varying with its intensity and with the state of the constitution, in respect both of organic nervous energy and of vascular tone. When the latter remain unimpaired, the production of coagulable lymph is a common result; but the lymph, being secreted in a fluid state, will often, when the internal membrane of the heart is inflamed, be washed into the current of the circulation before it can be coagulated, and no very manifest evidence of the disease may be detected after death, although it has existed in its most intense form, or even has been the cause of death. When the inflammatory action is co-existent with depressed vital power, and a morbid state of the blood, the fluid secreted by the inflamed surface is incapable of coagulating, and it readily mixes with, and contaminates, the vital current; the seat of disease presenting after death but little change, beyond dark discolouration, and softening. In respect both of the internal surface, and of the substance of the heart, lesion of the capillary action and tone, as well as of vital cohesion, may have existed during

life, and yet escape detection after death; and certain of the changes sometimes observed—especially alterations of colour, fibrinous coagula attached to the valves, &c., and slight effusion into the pericardium—have either taken place shortly before, or at the period of, dissolution, or even soon after this issue.

24. Although most of the affections and lesions of the heart are to be imputed chiefly to inflammatory action and its consequences, varied by the conditions alluded to, yet they are not altogether of this nature, or do not always originate in this way. We have seen above (§ 5.), that this organ derives its energies chiefly from the ganglionic nervous system; it must, therefore, follow that extreme depression or exhaustion of this system must be attended by a marked alteration of the functions of the heart: indeed, the evident imperfection of the actions of the latter is one of the principal indications we possess of the exhaustion of the former. And, if this alteration or imperfection of action continues long, or returns frequently, lesion of structure, especially dilatation, softening, thinning, atrophy, &c. of the parietes of one or more of the compartments of the organ, &c., must ultimately take place. Nor is this the only mischief; for, along with it, alteration of the circulating fluid often exists,—this latter still further impairing nervous or vital power,—and, in connection with both these pathological conditions, inflammatory action, or an altered state of vascular action constituting one of the morbid conditions usually so denominated, occasionally also takes place in the internal surface of the heart, or in some other of its constituent tissues, giving rise to the further changes already alluded to in general terms, and hereafter to be more particularly noticed.

25. iii. *The general Characters and Diagnosis of Diseases of the Heart,* naturally divide themselves into—1st. *The Local Signs*; and, 2d. *The general Symptoms, or sympathetic phenomena.* The former have been generally termed *physical*; the latter, *physiological* and *rational*: but the one class should always be considered in connection with the other in the course of practice.—A. *The local signs* are ascertained by *auscultation, percussion, inspection, and palpitation.* Of the former of these means, sufficient notice has been taken. (See arts. AUSCULTATION, and CHEST.)—The latter requires equal care with the former; and the sensations communicated to the hand of the examiner, as well as those excited in the patient by the examination, should be attentively ascertained and estimated. The indications furnished by these means are diversified according to the nature of the diseases which furnish them; but they can be known only by listening to the extent, seat, and nature of the sounds given out by the organ, or elicited by percussion; by observing the form and motions of the præcordial and adjoining regions; by feeling the motions, tremors, or thrills, often existing in these situations; and by ascertaining the sensations of the patient upon pressing between the ribs, or on the præcordia, or upwards upon the diaphragm, and under the anterior margin of the left floating ribs.

26. B. *The general symptoms, or sympathetic phenomena,* are ascertained from attentive observation of the several related functions.—The very intimate relation of the heart to all the

principal viscera, but especially to the blood and circulating vessels, to the organic or ganglionic nervous system, and to the respiratory organs, and the influence which these exert upon this organ, and which it exerts upon them, severally and conjointly, require to be kept in view. The manner, also, in which the brain, the liver, and other digestive organs, are often affected by diseases of the heart, may likewise be made a source of information. Most of the connections which have been traced between affections of distant organs and the heart, have been imputed to augmented or impaired actions of the latter—most frequently to hypertrophy. But there is sufficient evidence to prove that interrupted circulation, caused by alterations of the valves or of the orifices, is much more concerned in the production of sympathetic disturbance, and even of structural lesion, of remote as well as associated parts, than hypertrophy, or excited action. An impeded passage of blood from the auricles occasions congestion of the venous system; serous effusion into shut cavities; and cellular or parenchymatous structures; hæmorrhages from mucous surfaces, or into the substance of organs; and not infrequently congestions or enlargements of the liver or spleen. When hypertrophy exists, it is generally caused by the increased action required to overcome an obstacle situated at the outlet from the hypertrophied compartment; yet still the obstacle is but imperfectly overcome, and the force of the current of blood beyond the seat of obstruction is even less than in health. The necessity, therefore, of ascertaining the pathological states of remote as well as of collatitious parts, in connection with the actions and sounds of the heart, in order to arrive at correct conclusions as to the diseases of the latter, is manifest. The relations of morbid actions must be duly estimated, without assigning a preponderating or an exclusive share to one or two conditions, and overlooking all the rest. No partial or empirical views should be entertained; and far less ought a charlatan-parade of examination be pursued and acted upon, to the neglect of physiological inquiry, and of rational deductions. There is as much empiricism at the present day in the modes of investigating and observing diseases, as in those of curing them; but there is this difference—that the empiricism of the former kind is much more *ad captandum* than the latter, and generally more fussy, and often more offensive.

27. iv. *Of the Nature and Arrangement of Diseases of the Heart.*—A. The nature of these diseases has been partially noticed, when viewing the alterations of structure attending or consequent upon them (§ 23, 24.). Of the intimate nature of these maladies we know nothing more than is intimated by function or action, or is made apparent on close inspection.—a. When disordered action is suddenly excited by mental emotions, or by affections of related parts, and as suddenly ceases, leaving the organ in the integrity of its functions, we infer that the disturbance is seated in, or extends to, that part of the organic nervous system which actuates it; and this view is confirmed by the *juvantia* and *ledentia*, and often by the appearances observed after death in persons who had been thus affected, and who had died of other diseases. In these cases, the disorder must, in the present state of our

knowledge, be viewed as purely *functional*, or *nervous*, or *dynamic-vital*, as termed by various writers; and it may, without much stretch of ingenuity, be chiefly referred either to impaired action, or to excessive action. In these affections, the nervous system of organic life—particularly that part of it supplying the heart—is primarily disordered, and continues the only or chief seat of the disturbance for some time. But if either affection be excessive, or enduring, then alteration of structure may result, and assume one or other of the forms about to be noticed.

28. b. Diseases of a most serious nature often attack the heart, in which, conjointly with more or less disturbance of the organic nervous influence, the vessels supplying one or more of the constituent tissues of the organ, exert a morbid action, and give rise to various changes of structure, according to the grade of vital power, and to the state of the blood. These diseases frequently take place less obviously, or much more insidiously, than the foregoing, although often, also, in a severe and acute form; and they are always dangerous. The rapidity of their course, as well as the changes they produce, depends upon the intensity of the morbid vascular action, and the constitutional states just mentioned. From the circumstance of this action being attended by injection and development of the vessels, particularly of the capillaries, and giving rise to changes usually observed to follow inflammation in other parts similarly constituted, it has been denominated *inflammatory*. By this term, however, it is not intended to be implied that the morbid vascular action altogether consists either of diminution, or of augmentation, of the vital properties of the vessels; but that, as I have contended in the articles *DISEASE* (§ 87.), and *INFLAMMATION*, it is rather an *alteration*—a *perversion* of these properties that constitutes inflammation, and not a change simply *dynamic*; this change, whatever direction it may take, forming only one of the elements of the morbid state. Beyond this, we can hardly advance in our analysis of the nature of inflammatory diseases of the heart; but we may infer, with some probability, that, when the organic nervous or vital powers are unimpaired, and the blood is not altered, the morbid vascular action will produce more or less of the excited or sthenic condition, will exert a formative process, and will most probably form lymph, which will coagulate if allowed to remain for any time in contact with the part which produced it; or occasion thickening, or a condensation, of the affected parts; or give rise to other changes varying with the grades of action;—and we may further conclude, with equal justice, that, when the vital powers are depressed or exhausted, or the blood altered or contaminated, the local morbid action will be asthenic, will be incapable of developing the changes just specified, and, in their place, will produce, according to its seat, a sanious or sero-sanguineous fluid from the surfaces, that will further contaminate the blood, if the internal membrane be implicated, or give rise to softening, discolouration, &c. of the substance of the organ, if this part become affected.

29.—c. Under the above two heads may be comprised those affections of the heart which may be said to be primary, as respects this organ, although they are often associated with, or even

preceded by, disorder of other viscera, as well as by alteration of vital power and of the circulating fluids. But there is another class of cardiac diseases, which present different characters, and consist, in a great degree, of change of structure, often associated, however, with disorder of the organic nervous influence, and sometimes also with more or less marked alteration of vascular action in one or more of the constituent tissues, or compartments, of the heart. They may be said to proceed from the morbid conditions already discussed, especially when these exist in sub-acute, or in slight or chronic forms. That this is the case, will become apparent, when I come to describe them individually. It will then be fully shown, that impaired, or irregularly exerted, nervous influence, and morbid vascular action, in one or more of the constituent structures of the organ, have, together or singly, altered their nutrition, or impaired the vital cohesion of the molecules of which they are formed; and that the consequences of altered nutrition and impaired vital cohesion chiefly consist of the increased or diminished thickness and density, the augmented redness and elasticity, the softness, the dilatations, &c., of the parietes of the cavities; and of the fungous or polypous excrescences, the cartilaginous and osseous formations, and the different morbid productions, &c., found in the heart and pericardium.

30. B. Conformably with the above view of the nature of affections of the heart, I shall divide them into — 1st. Disorders which are merely nervous, or functional, and chiefly dependent upon the state, or distribution, of the ganglionic nervous influence, particularly in respect of this organ; and under this head will be comprised — (a) Impaired and irregular actions of the heart; — and, (b) Excessive action of the heart. —

2d. Diseases in which, conjointly with more or less disturbance of the organic nervous influence distributed to this organ, the blood-vessels of one or more of its constituent tissues manifest a perverted or morbid action. Under this division will be considered — (a) Inflammation of the endocardium, or internal membrane of the heart; — (b) Inflammation of the pericardium; — and, (c) Inflammation of the heart, or carditis. —

3d. Effects of consecutive lesions of the heart, resulting from, and often associated with, one or more of the above pathological conditions. Under this head will be discussed — (a) Atrophy of the heart; — (b) Edema of the organ; — (c) Softening and hardening of the structure; — (d) Adventitious productions in the heart; — (e) Changes of the dimensions of the orifices and valves; — (f) Changes in the dimensions of the cavities of the heart; — (g) Hypertrophy of one or more of the compartments; — (h) Rupture and wounds of the heart, &c. &c.

31. v. Of the Course, Termination, and Duration of Cardiac Disease. — Affections of the heart may be acute, sub-acute, or chronic. — A. Those which are nervous, or functional, are most frequently chronic, remittent, or even periodic; yet they are sometimes acute, and of very short duration, as in cases of cardiac syncope, &c.; and frequently terminate without any lesion of structure, although they occasionally induce it. — B. Inflammations of one or more of the constituent tissues of the heart may assume any grade of intensity, and pursue accord-

ingly an acute or chronic course, or even any of the intermediate or sub-acute states. The chronic form may be consequent upon the acute; or it, as well as the sub-acute, may appear primarily, especially when the inflammatory action is limited in extent, or is confined to a single constituent tissue of the organ. Although they may terminate in resolution, yet they most commonly give rise to organic changes, amongst which must be ranked the effusions of fluid, &c., frequently met with in the pericardium. — The more intense states of inflammation of either of the surfaces, or of the substance of the organ, may terminate fatally in two or three days, whilst the less severe or chronic states may continue months, or even years. But when they become thus prolonged, it is generally owing to their having passed into organic change, or to a temporary subsidence of the morbid action, and to returns or exacerbations of it, under moral or physical influences. — C. Organic lesions of the heart are extremely uncertain as respects their course, duration, and termination. Even when most manifest and extensive, their symptoms and progress are by no means uniform; the most distressing phenomena, as in inflammations of the organ, often varying, disappearing, returning, or pursuing very different courses, in separate cases, or even in the same person at different periods. They frequently, also, present more or less evident remissions and exacerbations, or even a marked periodicity. This circumstance probably induced CONVISCANT, and especially ROSAN, to refer many cases of nervous asthma to organic disease of the heart. But this circumstance is explained by the fact already adverted to — that change of structure, even when most prominent, is only one of the elements of the cardiac malady, the organic nervous energy of the organ being also always more or less affected; and we know that intermittence, or periodicity, is characteristic of affections of the nervous system. — The exacerbations or violent paroxysms which patients with organic lesions of the heart experience, is not, however, altogether owing to periodicity of the morbid action, but is often excited by mental emotions, by errors in diet, by over-distension of the stomach or colon, by neglect of the excreting functions, and by exposure to atmospheric vicissitudes.

§2. vi. The Complications of Diseases of the Heart, are important objects of consideration, in respect both of the associations of these diseases with one another, and of their connection with other maladies. — A. Nervous affections of the heart are often attendant upon disorders of the digestive organs, on flatulency, on congestions of the liver, and on disorder of the respiratory functions. They are frequently also observed in the course of chlorosis, hysteria, and anæmia; and are often excited by affections of the womb, and by the puerperal states. Indeed, the numerous pathological causes (§ 20.) of cardiac diseases form also complications with them. — B. Acute or chronic inflammation of the internal membrane of the heart sometimes extends to the pericardium; and inflammation commencing in the latter surface very frequently reaches the former. This association of inflammation of both surfaces, or extension of the morbid action from the one to the other, especially from the external to the internal membrane, is to be explained by the

proximity of the one to the other in certain parts of the organ, and by the circumstance of the connecting cellular substance being frequently implicated, especially when the pericardium is inflamed. This fact, which is much insisted upon by BOUILLAUD, has been taught in my lectures since 1825. — C. Inflammations of these membranes are also often complicated with, or consequent upon, acute articular rheumatism, or inflammation of the pleura or lungs. This association is met with in a very large proportion of cases of these diseases. — D. The complication of organic lesions of the heart with those of the large vessels, and particularly those of the aorta, are well known; and of softening, dilatation, &c., with adynamic fevers, scurvy, purpura, &c., has been often remarked. The connection existing between obstructions at the orifices of the heart, and commencement of the large vessels, and hypertrophy; and between these and diseases in the lungs and brain, especially apoplexy, palsy, pulmonary hæmorrhage, effusion into the cavities of the chest, anasarca, &c.; will be more fully shown in the sequel.

33. vii. *The Prognosis of Cardiac Diseases.* — SENAC and CORVISART entertained the most unfavourable opinion as to the result in diseases of the heart. The latter writer even affixed the epigraph — “*Hæret lateri lethalis arundo*” — to the titlepage of his work. At the present day, more favourable ideas are entertained on this subject, although the opinion of CORVISART will still hold with respect to some of the organic changes of the organ. — a. *The nervous affections of the heart* will frequently yield to treatment, unless they be very violent, when an unfavourable, or at least a guarded, prognosis should be given. — b. *Inflammations of the membranes, and even of the substance of the heart, if they come early under treatment, will often terminate favourably; yet they ought, nevertheless, to be viewed as very dangerous maladies, as respects both the organic lesions they may cause, and the contingency of an immediate or sudden dissolution.* — c. Most of the organic lesions of the organ are incurable; and yet the patient may live many years, when judiciously managed. — Of this kind are, induration of the valves, narrowing of the orifices, chronic pericarditis, hypertrophy, &c. — The unceasing functions of the heart, and their extreme importance to the economy, however, render diseases of it more dangerous than those of almost any other organ. But the advances that have been recently made in their diagnosis, have given greater precision to the treatment, and have consequently afforded a greater degree of success, than formerly.

34. viii. *The Treatment of Cardiac Affections.* — A. *The nervous affections of the heart, especially those associated with disorder of the digestive and assimilative organs, or characterised by irregular or excessive action, have been too generally, and most injuriously treated, by vascular depletions and purgatives.* I have seen even the complication of palpitation with chlorosis treated by depletions, and a complete state of anæmia result. In cases of this kind, a judicious selection of tonics, chalybeates, anodynes, and stomachic aperients, appropriately to the peculiarities of each, aided by light, nutritious diet, by gentle exercise in an open dry air, and some-

times by tonic and alterative mineral waters, will generally remove the complaint.

35. B. *The inflammatory diseases of the heart* require more or less copious and repeated depletions, — in the acute stage, the most decided adoption of them, as well as of other antiphlogistic means. — M. BOUILLAUD has strongly insisted upon the propriety of prescribing repeated bloodlettings; but, although the depletions he recommends are considered large, in France, they are not larger than those usually directed in this country for the same diseases. The exhibition of calomel and opium, or of calomel, antimony, and opium, in repeated doses, to promote the resolution of the inflammatory action, or to prevent it from passing into the chronic state or from terminating in effusion, or to limit the effusion of lymph, or to prevent the organisation of what may have been effused, and promote its absorption, is the next most important means, and should always follow immediately after a decided vascular depletion, in the manner described in the article BLOOD (§ 64–68.). — This practice, somewhat modified from that adopted by British medical practitioners in warm climates, was first brought into use in this country, by Dr. HAMILTON, of Lynn Regis (*Medical Comment, &c.* vol. ix. p. 191. Lond. 1785.). His paper on this subject — the most valuable in modern medical literature — contains all the modifications that have been attempted in this practice, by Dr. ARMSTRONG and other more recent writers, with the view of appearing original. It has been erroneously stated, by several who have adopted this treatment, that Dr. HAMILTON always prescribed these medicines until the gums were affected by them; and it has been claimed as a point of originality, that they have employed the same means so as not to produce, or short of producing, this effect. In some complaints, however, and even in some of those under consideration, this effect is necessary to the successful operation of these substances. That Dr. HAMILTON, however, thought it unnecessary to employ them, in certain diseases, as rheumatism, &c., so as to affect the mouth, is shown by his remarks respecting their operation (*Opuscula*, p. 200.). He there states, that he first directed them upon the skin, or bowels, relying on their action from them without the mouth becoming affected; and that, when the skin is dry, hot, or contracted, emetic tartar should be added to the calomel and opium, in order to determine to this surface.

36. When inflammations of the heart come under treatment at a more advanced stage, or when they have assumed a more chronic form, vascular depletions must be prescribed with greater caution, and the calomel and opium should be given, until either the gums become affected or a slight pyalism be produced. If the action of the heart be irregular, or excited, a small quantity of camphor may be added to each dose of these medicines; and, if the pulse be hard and regular, a repetition of the bloodletting, and a combination of James's powder or of tartar emetic, or of ipecacuanha, with the calomel and opium, will act beneficially, both upon the circulation, and upon the emunctories. The bowels should be kept freely open, and the action of aperients be promoted by enemata.

37. Although it is necessary to have recourse

to copious depletions in the acute or early stage of inflammations of the heart, yet their effects should be carefully watched; and they ought to be still more cautiously employed in chronic or advanced cases; for there are very few inflammatory diseases, in which they may prove more beneficial, than in these, if they be resorted to at the proper time, and in sufficient quantity; or in which they may be more injurious, if too long delayed, or too sparingly employed, or carried too far. When prescribed in a timid manner, and if a decided use of calomel and opium, sometimes with antimony, colchicum, or other adjuvants, be not adopted, an acute inflammation, which would otherwise have entirely subsided, either passes into a chronic state, or gives rise to organic changes embittering the shortened period of future existence. Yet, whilst thus prompted to decision, it must never be overlooked, that in most cases of inflammation affecting this viscus, the organic nervous energy is more or less impaired or irregularly determined; and that the most decisive measures should, therefore, be directed with the utmost circumspection. The other means which may be brought in aid of those already noticed, are comparatively of so little importance, and require to be so varied according to the forms and stages of the disease, that no mention need be made of them until the specific affections of the organ come under consideration.

38. C. The organic lesions of the heart require a much more prudent recourse to depletions than the diseases just dismissed, inasmuch as the nervous influence, especially that actuating the organ, is much more impaired, in the former maladies than in the latter. In cases of dilatation of one or more of the cavities, even a moderate depletion may be followed by a fatal result; and when there is hypertrophy, the heart requires all the energy it possesses to overcome the obstacle in the way of the circulation. The small but repeated depletions, and the antiphlogistic regimen, recommended by VALSALVA and ALBERTINI, and so generally adopted in organic diseases of the heart, may be carried too far, as CORVISART has justly shown. They may be even most in-

There are few means which are applicable to the heart, as generally, applicable to the system, comprising mental and physical qualities, and attention to the digestive and excreting functions. Vital energy seldom admits, in them, of being lowered; and whatever acts in this manner, should be employed with discrimination, or appropriately to those states which seem especially to require it.—In them, also, moral training, attention to diet, living in an equable temperament, and in a healthy and airy situation, a gently open state of the bowels, and a due secretion of bile, and the careful avoidance of whatever excites or aggravates the disorder of the heart, are amongst the most generally applicable means of treatment. Numerous other measures may be employed, but they are applicable only to particular lesions, and therefore will be mentioned where the treatment of these lesions is particularly discussed.

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III. OF NERVOUS OR FUNCTIONAL AFFECTIONS OF THE HEART.

i. OF IMPAIRED OR IRREGULAR ACTION.—CLASSIF. I. CLASS, III. ORDER (Author).

39. DEFIN.—The action of the heart more or less weakened or irregular, with faintness, or depression, and often with disorder of the digestive organs.

40. The functions of the heart may be imperfectly performed in two principal ways:—1st. They may be simply weakened, but in every grade, until they become extinct, and yet structural lesion may not be detected to account for

the circumstance. — 2d. They may be impaired or enfeebled, with more or less irregularity of the contractions, and yet no organic change may exist; the impaired and irregular action occurring only temporarily. One of the most familiar forms in which this affection presents itself, is that of fainting or syncope. But in this the heart is not always primarily affected. — *A. Simply Enfeebled Action of the Heart*, depending upon deficient energy of the cardiac ganglia, may proceed from whatever depresses the organic nervous influence, or from inanition or anæmia. It may also be sympathetic, or the result of a derivation of the vital influence to different organs, as during certain periods of impregnation. The causes, pathological states, the diagnosis, and treatment of this affection, are fully described under the article **Fainting**.

41. *B. Enfeebled and Irregular Action of the Heart*, is a common affection in its slighter grades. — The pulsations may be unequal, in frequency and power, or they may be intermittent, reiterated, or fluttering. This state of action, although attending various dangerous diseases of the organ, may be entirely nervous, or connected with depressed organic nervous power, and enfeebled function of the stomach and liver. In this latter case especially, it is often induced by flatulence, particularly when the flatus rises into the œsophagus and is retained there by spasm of the canal. It also may proceed from mental emotions, or from whatever overloads the cavities of the heart, or interrupts the return of blood from the lungs, or causes congestion of the left auricle and pulmonary veins.

42. *C. Treatment*. — Unless it is attended with a sense of sinking, or oppression, or anxiety, at the præcordia, this affection requires only attention to the digestive, assimilating, and excreting functions, and to diet and regimen. But if these symptoms are present, restoratives, especially camphor, the preparations of ammonia, the ethers, carminatives, and tonic^s conjoined with either of these, will often be necessary. Much advantage will also result from taking a digestive pill (F. 507. 562.) at dinner or bed-time. A small or moderate bloodletting is not infrequently prescribed in cases of this kind, with the view of removing congestion of the heart or large vessels. When the patient is plethoric, or when the irregularity is consequent upon the suppression of an accustomed evacuation, or of congestion of the portal system, this practice is judicious, if cautiously resorted to. In the latter circumstances, the application of a few leeches around the anus will often be of service. The bowels ought also to be freely acted upon by deobstruent and mild purgatives. In these cases, although there may be vascular plethora, or local congestion, nervous or vital power is at the same time more or less impaired, and therefore the means of restoration just mentioned should also be employed. The treatment about to be advised for palpitations (§ 50.) is often also appropriate in this affection. — When enfeebled and impaired action of the heart occurs in gouty persons, or appears as *misplaced* or *retrocedent* Gout, the means advised under such circumstances in that article (§ 83. 89.) should be prescribed.

ii. **EXCITED ACTION OF THE HEART.** — SYN.

Καρδιαγμία, Hippocrates, Galen; Cordis Palpitatio, seu Pulsatio, *Palmus* (παλμός, a beating or palpitation); *Cardiopalmus*, Swediaur; *Tremor Cordis*, Palpitatio, Cullen, et Auct. var.; *Palmus Cordis*, Young; *Clonus Palpitatio*, M. Good; *Palpitation*, *Palpitation du Cœur*, Fr.; *Das Herzklopfen*, Germ.; *Palpitatione*, Ital.; *Palpitation*, Palpitation of the Heart.

CLASSIF. — 2. Class, 3. Order (Cullen).

4. Class, 3. Order (Good). II. CLASS, I. ORDER (Author).

43. **DEFIN.** — *Strong, frequent, or tumultuous action, with an increase of the impulse and natural sounds of the heart, so as to be sensible, and often distressing, to the patient, without appreciable lesion of the structure of the organ.*

44. *A. Palpitations* are either nervous or functional, or symptomatic of some one of the more serious diseases of the heart, hereafter to be considered. The former only of these fall under discussion at this place. — Nervous palpitations may be either *primary*, and depending upon excitement of the nerves of the heart, without manifest disorder of other viscera, as in attacks induced by moral emotions; or *sympathetic* of affections of remote or related organs. They are often sudden in their accessions, but more rarely in their subsidence. The sounds of the organ are generally increased during their continuance; and the first sound is further augmented by the impulse or shock against the ribs, occasioning a distinct knock, which may be sometimes heard at a short distance from the patient. They are also occasionally attended by a slight bellows sound, which always disappears when the heart resumes its natural action. Nervous palpitations are often accompanied with uneasiness and slight anxiety at the præcordia; and sometimes, also, with a sense of sinking, or faintness, with which they not infrequently alternate.

45. *B. The Causes* differ much in their natures, or modes of operation; and modify accordingly the characters of this affection. — The nervous and irritable temperaments, early age, debility, in whatever way induced, venereal excesses and mental exertion, remarkably predispose to this disorder. — The *exciting causes* are — 1st. *Less* more active mental emotions, *love*, *ambition*, &c.; also sadness, anxiety, *misplaced* and longings after objects of affection, excitement of the imagination, &c.; — 2d. The abuse of spirituous liquors, and muscular exertions, or whatever accelerates the return of blood to the right side of the heart, and over-distends the large veins and auricles; — 3d. Excessive or debilitating discharges; the abstraction of a natural or necessary stimulus; sexual excesses, or masturbatio; this last being the most common and influential of the exciting causes; — 4th. Inanition, from deprivation of the necessary nourishment, or from impaired assimilation, or from excessive waste of the secretions, or circulating fluids, as in the palpitations associated with chlorosis and anæmia, or consequent upon depletions; — 5th. Pressure on the large vessels, occasioned by strait lacing, by pregnancy, by abdominal tumours, effusion, &c.; — 6th. Enfeebled action of the digestive functions, particularly when attended by flatulency and torpor of the liver, or constipation of the bowels; — 7th. The irritation of worms in the intestinal canal, in connection with debility, &c.; — 8th. *Hysteria* in

several of its Protæan forms, especially when the uterine functions are disordered, and the catamenia either excessive or obstructed; — 9th. Irritation of the spinal chord, or of its nerves, or excitement of the uterus or ovary acting upon the heart, either directly by the great sympathetic nervous system, or mediately through the spinal chord; the irritation propagated to this latter being reflected from it along the branches communicating between it and the cardiac and other sympathetic ganglia.

46. Although these may be considered the principal causes, yet others sometimes produce functional palpitation; especially several antecedent disorders, and organic lesions, as — *a.* Adynamic and nervous fevers; — *b.* General plethora by overloading the auricles and large vessels; — *c.* Irregular, or misplaced gout, occasioning irritation of the cardiac nerves, or congestion of the large vessels or cavities of the viscus; — *d.* Obesity, particularly in connection with plethora; — *e.* Obstructed circulation through the lungs, owing to diseases of their structure, or to effusions of fluid pressing upon them, or other causes preventing their expansion; — *f.* Enlargements of the abdominal or pelvic viscera, or effusions into the peritoneum, preventing the easy descent of the diaphragm, or pressing upon that part connected with the pericardium, as enlarged or engorged liver or spleen, pregnancy, ascites, &c.

47. *D. Course and Duration of Nervous Palpitation.* — *a.* This affection varies somewhat according to the cause which produced it. — *a.* When it proceeds from mental emotions, it is often violent, but of very short duration. — *β.* When it arises from masturbatory, it is not so excessive, but it is more prolonged; or remittent or recurrent. — *γ.* Palpitations sympathetic of dyspepsia are seldom severe, unless in persons of the nervous or irritable temperaments, nor of long duration; but they are readily excited, particularly by a full meal, or by indigestible, or flatulent, or fluid food. In such cases the action of the heart is irregular, as well as excessive, tumultuous or fluttering, and attended by anxiety, sometimes by faintness, and by accelerated breathing or dyspnoea. — *δ.* When this affection proceeds from misapprehension of the attendant sensations, or from the violence of the palpitations. The action of the heart is excessive, most irregular, or tumultuous, and attended by distressing anxiety, or sense of sinking or of anguish at the præcordia often extending to the epigastrium, and by extreme restlessness, and a feeling of impending dissolution. — *ε.* Palpitation is very often an attendant of hysteria; and in this case is excited or aggravated by the globus hystericus, or by the borborygmi or intestinal flatulence, characterising the latter affection. A feeling of strangulation frequently accompanies this form of palpitation; and, in two or three instances, I have observed an almost sudden swelling of the thyroid gland to take place, this part returning to, or nearly to, its former state very soon after the attack. In more than one of these cases, there was evidence of co-existent irritation or excitement of the uterine organs. Hysterical palpitation sometimes alternates with faintness, or is connected with excessive bleedings, &c. — *b.* The Duration of

palpitation is most indefinite. It may continue only a few minutes; or many days. It may be remittent; intermittent, or even periodic; but its course is more generally irregular.

48. *E. Diagnosis.* — It is often easy to distinguish nervous palpitation from that symptomatic of organic lesion; but quite as often the diagnosis is very difficult. That it should be made with accuracy is most important, as respects both the treatment, and the immediate happiness of the patient; for many distress themselves and aggravate their complaints with fears of an organic malady, whilst they are affected only with functional disorder. When nervous palpitations are prolonged, remittent, or return frequently and are severe, the diagnosis is generally difficult: if attempted during their continuance, it is still more so; and if deferred until the period of intermission, it is often not much less difficult; for some organic lesions occasionally present periods, in which the symptoms are remarkably ameliorated. Yet an attentive examination of the whole chest by percussion, auscultation, by the eye, and by the touch, will generally determine the question with great accuracy, and show that, in this affection, the heart is not enlarged, and that the blood circulates freely through its various orifices. The extended dulness on percussion, the morbid or adventitious sounds, the more or less constant dyspnoea, the venous congestions, the bloated state of the countenance, the dropsical effusions, &c., sufficiently mark organic lesion of this organ, especially if it have become far advanced. Sometimes, however, great nervous sensibility, or an hysterical affection, may be attendant upon some degree of alteration of structure; the palpitation recurring in severe paroxysms after slight mental emotions, or other causes affecting the nervous system, and leaving the patient comparatively easy, and with few precise or well-marked symptoms in the intervals. This is not infrequently observed in persons who have been subjects of inflammation of one or more of the constituent tissues of the heart, that has left behind it slight structural change in connection with an irritable state of the organ, and great susceptibility of the nervous system.

49. In addition to these considerations, the following circumstances may be adduced as distinctive of a functional disorder: — 1st. The general prevalence of nervous symptoms, and the recurrence of the attack from causes acting on the nervous systems; — 2d. The return of the affection when the patient is quiet, and the relief following gentle or moderate exercise in the open air, and the means used to improve the digestive functions and to restore the nervous energy; — 3d. The prolonged and complete intermissions during an improved state of the general health, and the exacerbations consequent upon whatever depresses or exhausts organic nervous power, especially upon the operation of any of the causes enumerated above (§ 45, 46.); — and, 4th. The absence of the physical signs characterising any of the inflammatory and structural diseases about to be considered.

50. *F. Treatment.* — *a.* The means prescribed for this affection should have a very strict reference to the causes which produced it, and especially to the pathological state of which it is

and discrimination, or they may be injurious:—**LAENNEC** and **BOUILLAUD** advise bloodletting and other reducing and tranquillising means, in the manner recommended by **ALBERTINI** and **VALSALVA**, and to a decided extent. But I agree with **Dr. HOPKINS**, in considering these measures hazardous, and often injurious, when pushed as far as these writers direct.—**M. LAENNEC**, especially, insists upon copious depletion at the commencement of the complaint,—upon a repetition of it every two, four, or eight days, until the palpitations cease, and the heart gives only a moderate impulse,—upon spare diet, with very little or no animal food, — and upon physical and mental repose. If the treatment is not commenced until hypertrophy has occasioned dyspnoea, dropsical effusions, oedema of the lungs, &c., he still advises bleeding and abstinence; and, in all cases, a perseverance in this plan, especially in abstinence, for many months; and he has no confidence in a cure until the expiration of a year (if the patient live as long) of complete absence of all the symptoms and physical signs of hypertrophy.—As to bloodletting, the opinion of **M. BOUILLAUD** is not materially different from that of **LAENNEC**. He prescribes, for an adult of medium strength, and for a medium degree of the complaint, three or four bleedings at the arm, each consisting of twelve or sixteen ounces, followed by one or two cuppings on the præcordia of eight or twelve ounces each, in the course of the treatment. He considers *digitalis* as the next most important remedy—as the true opiate of the heart; and employs it both internally and externally. He applies a blister on the præcordia; and he sprinkles the blistered surface with from six to fifteen grains of powdered *digitalis*, directing, at the same time, and long afterwards, mental and bodily repose, and a very restricted diet.

183. a. Respecting bloodletting in this malady, my experience and opinions are in accordance with those of **Dr. HOPKINS**; and I consider, with him, sparing abstractions of blood, at intervals of two or three weeks or more, to be the most beneficial. More copious depletions have given temporary relief; but the symptoms have soon returned with increased violence, and carried off the patient, especially in cases where there were also dilatation and lesions of the valves or orifices of the heart. As I have shown in the article *Blood* (§ 58.), large depletions increase the frequency of the heart's action; and this effect is more readily produced by them when this organ is in a state of enlargement. I perfectly agree with the above writer in considering, that the indications of treatment should be to diminish the quantity, without deteriorating the quality, of the blood, and without producing reaction, or permanently enfeebling the action of the heart and the energies of the constitution,—that from four to eight ounces of blood, taken every two, three, four, or six weeks, according to the circumstances of the case, will be sufficient to fulfil this indication, to keep down inordinate action, and to relieve the dyspnoea,—that the diet should be spare, and consist of white animal food, and liquids in small quantity; and that every thing heating or stimulating, or calculated to accelerate the circulation, ought to be avoided.

184. b. Much benefit will result from a judi-

cious selection of internal medicines.—Of these, *digitalis*, *colchicum*, the sub-borate of soda, mercurial alteratives, hydriodate of potash, refrigerants and diuretics, are most deserving of notice. The secretions and excretions should be freely promoted, by a mercurial alterative taken at bedtime, and a mild purgative in the morning. Equal parts of infusion of *digitalis* and camphor mixture may be also given twice or thrice a day with five or six grains of the sub-borate of soda; or small doses of *colchicum*, with an alkaline subcarbonate, may be prescribed, in an infusion of *tilea Europæa*, or decoction of marsh-mallows.—Diuretics are also of service, especially the supertartrate of potash with the sub-borate of soda, in the compound decoction of broom-top, or in a weak infusion of *senega*, or in camphor oil, or in the decoction of *taraxacum*,—the nitrate of potash or soda, with spirits of nitric æther,—and the acetate of potash, with small doses of squill, or the infusion or spirit of juniper. When dropsical effusions take place, these, varied according to the peculiarities of the case, and aided by hydrogogue purgatives, are required; and one or other of the liniments prescribed in the Appendix (F. 297, 311.), with the addition of a little of the hydriodate of potash, may be rubbed or applied over the thorax daily. When the breathing becomes much affected, camphor, with small doses of *ipecacuanha*, and with *hyoscyamus*, or *belladonna*, &c., may be tried; and when debility or irritability is urgent, camphor, conjoined with hydrocyanic acid, or with *digitalis* and the extract of hop, or with gentle tonics and other narcotics, as the acetate of morphia, will be very serviceable. *Digitalis* was much praised by **FERRIAR** in palpitations from organic lesions; and, when hypertrophy is attended with excessive action and distressing irritability, the following will be found useful:—

No. 256. R. Infus. *Digitalis* 3 vijas; Potassæ Nitricæ ʒij.; Acid. Hydrocyanicæ M℥iv.; Syrup. Aurantii ʒij.; Misco. Capiat æger Coch. l. amplum secundâ quaque hora.

185. c. When diseases of the valves and orifices of the heart have been concerned in the production of hypertrophy, the treatment is not much different from that above advised, if indeed at all different, and is not much advised. The fixed alkalies, especially *potassa*, may be given in suitable combination with *digitalis*, camphor, and various diuretics. The internal exhibition of the hydriodate of potash has been tried by me in several cases; but the results have not always led me to persist in the use of it in cardiac hypertrophy from this cause. It may, however, be given in small doses, with liquor potassæ: it will then not be injurious.

186. d. External derivatives, especially setons or issues, inserted near the margins of the false ribs, or below them, have been prescribed by me in several cases, and in some with marked advantage. In every instance, the treatment should be assiduously persisted in; and a most abstemious diet and regimen rigidly observed. Repose of mind and body, and residence in a dry and pure air, are also most beneficial.—As the features of the disease vary, so should the treatment be modified, care being taken not to reduce the energies too low. As soon as exhaustion is it ought to be met by restorative means.

a free discharge is procured by setons or issues—which are especially indicated when the hypertrophy has been consecutive of rheumatic disease of the heart,—a gently tonic treatment will be often requisite; and if any preparation of colchicum be exhibited, it should be given with camphor or ammonia, or even with stomachic or gentle tonics.

ii. OF DILATATION OF THE CHAMBERS AND ORIFICES OF THE HEART.—*SYN. Cordis Aneurisma, Ballonius, Baglivi; Passive Aneurism of the Heart, Corvisart; Cardieuryisma, Cardiectasia, Auct.; Expansion of the Heart's Cavities.*

187. *CHARACT.*—*Slight palpitations, with dyspnoea and cough; the impulse of the heart being weak and diffused; the sounds being louder, clearer, shorter, and heard over a larger extent of the chest, than natural; and the pulse being weak, small, or irregular.*

188. *A. DESCRIPTION.*—Dilatation (a) may affect equally the whole parietes of one or more of the cavities; or (b) it may be so confined to a portion of the parietes of a chamber as to form an aneurismal pouch.—a. The first of these varieties usually presents itself in three forms:—1st. *With thickening of the walls of the compartments;*—2d. *With a natural state of the walls;*—and, 3d. *With attenuation of the walls.*—The first of these has been considered in connection with hypertrophy; and most of the remarks made with respect to it, also apply to the second of these forms. It is chiefly, therefore, to the third, or to dilatation with attenuation of the parietes of the chambers, that attention is now directed.—The muscular substance of the heart is often healthy, although dilated; but it more frequently is soft, flaccid, or even remarkably softened—especially when the attenuation, as well as dilatation, is great. Sometimes its structure is readily broken down by the pressure of the finger, and is of a deeper or darker red, or of a paler or more fawn-colour than natural. The more remarkable states of softening observed in connection with dilatation have been consecutive of inflammation of the inner surface, probably extending, in some cases, into the substance of the heart; and have also been observed in debilitated, previously diseased, and herectic constitutions.

189. This lesion of the heart is much rarer than dilatation with thickening, or with a natural state, of the parietes of the cavities; and the instances recorded of it are not numerous. LANCISI, MORAGNI, CORVISART, BERTIN, KREYBIG, J. FRANK, LAENNEC, LOUIS, and HOPE have described but few cases of it. BURNS and LAENNEC believed that rupture might proceed from dilatation; and Dr. HOPE and Dr. WILLIAMS have met with this occurrence, which is most likely to take place in aged persons. Dilatation with attenuation seldom affects one ventricle without the other; but it is more common, or greater, in the right than in the left ventricle. It more rarely is seated in all the chambers of the organ. The attenuation exists in various degrees. It may be so extreme, that the walls of the ventricles hardly are equal to two lines at the thickest parts (HOPE and CHOMEL). The fleshy columns are usually stretched and spread out. The inter-ventricular septum is proportionately less attenu-

ated than the other parts. The dilatation is more in the transverse than in the longitudinal direction of the ventricles; the heart thereby assuming a spherical form, and the apex being nearly effaced. When both the ventricle and auricle of the same side are much dilated, the intermediate orifice is generally also widened, and the valve insufficient to close it. As in cases of hypertrophy, the position of the organ is somewhat altered when the dilatation is great, it being more or less transverse, and towards the left. A very slight attention is sufficient to distinguish the distension that takes place, during the last moments of life, from morbid dilatation. The former is slight, presents the appearance of tension, and the muscular substance is healthy; the organ often resuming its natural size when emptied. The latter consists not only of distension, but also of flaccidity, thinning, and softening of the parietes.

190. b. *Partial dilatation of one of the heart's cavities* is but rarely met with. M. BERTIN states, that he has seen one portion of a cavity dilated, and another in its natural state, or even thickened, especially in the right ventricle, near the pulmonary artery. This is evidently a slighter grade of that lesion which has attracted, more recently, considerable attention, under the appellation of "*false consecutive aneurism*" (BRESCHET), "*sacculated aneurism*," and "*true aneurism of the heart*" (OLLIVIER). This alteration has been observed by GALEATI, BUTNER, CORVISART, BAILLIF, ZANNINI, BERARD, ROSTAN, CRUVEILHIER, BRESCHET, J. JOHNSON, ELLIOTSON, ADAMS, DANCE, REYNAUD, &c. It was found in the heart of TALMA, the celebrated French tragedian. It is exactly similar to the aneurism of large arteries, and has been met with only in the arterial side of the heart; and, excepting in a single case recorded by Dr. ELLIOTSON, where it existed in the left auricle, always in the left ventricle. In many of the cases it was found at the apex; in some at the base, or at the middle of the ventricle; and in others at the front, or side. In this last situation it was detected in TALMA. In the instances which occurred to REYNAUD and ELLIOTSON, two aneurisms were found in the same ventricle. This form of aneurismal tumour varies in size from that of a filbert to that of the heart itself. The larger tumours usually contain layers of dense coagula, similar to those which fill the cavities of arterial aneurisms. They communicate with the ventricle by a more or less narrow opening, which, with the whole of their interior surfaces, is generally lined with a membrane continuous with that of the ventricles. Like other aneurisms, they are most common in adult males.

191. c. *Dilatation of the orifices of the heart* is not less frequent than expansion of the cavities; and often coexists with it. The orifices may be dilated in various degrees, as already shown (§ 189.); but generally, when the change is very considerable, the valves become insufficient for their purposes, and the expansion, owing to the regurgitation into the auricles, extends to them. The auriculo-ventricular orifices are most frequently dilated; but in very rare instances, the arterial orifices have experienced this alteration in a slight degree.

192. *B. Causes.*—a. Most of the causes, remote and immediate, of hypertrophy, are also those

of dilatation of the *chambers* and *orifices* of the heart. As Dr. HOPE observes, dilatation is merely a mechanical effect of over-distension. Blood accumulated within the cavities, owing to an interruption to its exit from them, will dilate and attenuate their parietes, in proportion to the resistance opposed, and to the force exerted by the muscular structure in order to overcome it. When that force is weak, or insufficient to overcome the resistance, the parietes yield, and the cavities undergo dilatation, with a rapidity depending upon the weakness of the walls and the extent of interruption. It necessarily follows, that the cavity immediately behind the seat of obstruction will be the first to undergo dilatation, and will experience it to the greatest extent. The compartment, also, having the weakest parietes, is, *ceteris paribus*, the most frequently dilated. — Permanent dilatation is the result of prolonged or repeated causes, as contractions of an orifice, disease of the valves, and frequent returns of nervous palpitations. The depressing passions and emotions, as anxiety, fear, &c. (§ 19.), and whatever tends to weaken the power of the heart, may occasion this alteration. The walls of the cavities may also be unusually weak or thin, *congenitally* and *hereditarily*. LANCISI observed this lesion in four successive generations; and ALBERTINI saw a female die of dilatation, five of her brothers having been cut off by the same malady. It is most common in persons of a tall, thin, delicate, feeble, and nervous or lymphatic conformation, and lax fibres. — Age has also great influence on its production. It is not uncommon in young children; but it is most frequent in the aged. It rarely occurs in young adults, unless it has been induced by masturbation, or by fevers and diseases of the respiratory organs. In general, all obstructions to the circulation, whether situated in the orifices of the heart, or in the aortic or pulmonary system, will produce it, as well as hypertrophy; the supervention of the former being the result chiefly of debility of the organic nerves supplying the organ, and of impaired tone or deficient nutrition of the muscular structure — of antecedent disease, characterised by debility or cachexia, or by both.

193. *b.* When the *auricles* are protected by a natural state of their valves, and of the auriculo-ventricular orifices, the ventricles may be dilated without the former being materially affected; but when the auricular valves are diseased, so as to occasion interruption to the passage of the blood from the auricles, or when the auriculo-ventricular openings are dilated, so as to permit regurgitation from the ventricles, then the auricles become dilated, although rarely without some increase in the thickness of their parietes.

194. *c.* The diseases of which dilatation is most frequently consecutive, are, inflammations of the heart, and the lesions of the valves and orifices caused by them; rheumatism extending, or translated, to this organ; tubercular consumption; asthma and emphysema of the lungs; secondary syphilis, especially when treated by excessive quantities of mercury (ALBERTINI); adynamic, typhoid, and exanthematous fevers; scurvy, and carcinomatous and hæmato-encephaloid malady. M. BERTIN contends that dilatation is generally consequent upon some obstacle to the

course of the blood; and that the obstacle, at the same time that it gives rise to this lesion of the heart, produces other phenomena, as engorgement of the vessels, serous effusions, passive hæmorrhages; these phenomena, as well as the dilatation, being the result of the same proximate cause. Dr. HOPE justly observes that the change in the capacity of the cavities may result not only from obstacles to the circulation, but also from debility. There can be no doubt of deficient tone of the muscular parietes, and of the softening and asthenia of the organ, shown to follow adynamic fevers, and of protracted nervous palpitations, particularly when connected with chlorosis, anæmia, &c., being sufficient to cause dilatation of one or more of the chambers of the heart, independently of any appreciable obstacle to the circulation. Curvatures of the spine, and whatever diminishes the cavity of the chest, or presses inordinately upon the large vessels, may also occasion this alteration.

195. *d.* The same causes and pathological conditions which occasion the expansion of a whole compartment or of an orifice, may give rise to the dilatation of a portion of it only, in the form of an aneurismal cavity, especially whatever opposes the transmission of blood from the heart, as laborious occupations, the more violent mental motions as hatred, revenge, jealousy, anger, &c. — This — the only lesion of the heart which ought to be called aneurismal — may be produced independently of inflammatory action, owing to great muscular efforts, or obstacles to the circulation. Where the internal membrane is not destroyed, nor thickened, and where the muscular fibres are stretched, separated, or ruptured, antecedent inflammation may not have existed; but where there is thickening of the internal membrane, or ulceration, or adhesion of the external surface of the dilated part to the pericardium, this lesion may be considered to be a more or less remote consequence of chronic inflammation, affecting a portion of the parietes of the ventricle, the dilated part having lost its elasticity and contractile power. In connection with this, some obstacle to the circulation, or to the passage of blood from the left ventricle, has frequently also been present; the increased pressure arising from impeded exit, and the consequent yielding portion of the ventricle. In the unique case of aneurism of the left auricle recorded by Dr. ELLIOTSON, there were extreme cohesion and ossification of the mitral valve, and consequent reduction of the auriculo-ventricular opening, — changes always consequent upon inflammatory action, as above insisted upon (§ 68.). The sinus of the auricle formed a large aneurism, containing dense and thick layers of fibrine; the interior of the tumour being lined with the smooth membrane of the cavities, as in aneurism of the ventricle.

196. *C.* The Signs and Symptomatic Effects of Dilatation have been partly noticed under the head of hypertrophy with dilatation (§ 175.); but those which more especially indicate dilatation with attenuation, remain to be detailed. — *a.* When the affection is considerable, and extends to both ventricles in uniform expansion of the parietes, the heart acquires a rounded shape, and the degree of contraction is lessened; and, as the apex is consequently less forcibly impelled against

the ribs, the impulse is slight, brisk, and low in the præcordia. The first sound of the heart is shorter, louder, and clearer than usual, and is heard over a larger extent than would be expected from the weakness of the impulse. When the dilatation is considerable, the first sound resembles in shortness and flapping character the second, and is to be distinguished from it only by its synchronism with the pulse of the carotids (LAWRENCE, HOFFE, WILLIAMS). When the dilatation is dependent upon disease of the valves and narrowing of the origins of the arterial trunks, the sounds will assume a morbid character accordingly (§ 76.). The pulse in dilatation of the ventricles is necessarily feeble and often small, and various symptomatic lesions are observed, which, however, are referrible rather to the alteration that has produced the dilatation, than to the dilatation itself. In expansion of the left ventricle, the physical signs are most apparent to the left of the sternum, between the fifth and eighth ribs; and the symptomatic phenomena consist chiefly of dyspnoea, oppression in the præcordia, and dropsical effusions in the chest, &c. In expansion of the right ventricle, the physical signs are most evident under the sternum, and are accompanied with a pulsating swelling of the jugulars, especially if the dilatation extend to the auriculo-ventricular opening; the sympathetic changes being principally serous effusions within the cranium, or in the cellular tissue, ascites, oedema of the extremities, short breathing, and various signs of general cachexia.

197. *b.* The symptoms of partial dilatation (§ 190.) of the cavities are extremely obscure. Those stated by Dr. BAILLIE are common to all cardiac diseases. Auscultation renders us little or no assistance in ascertaining its existence. It rarely attains a large size — never so large as to produce an external tumour. The cases recorded by M. REYNAUD and Dr. J. JOHNSON terminated in rupture of the aneurism without any previous suspicion of its existence. Dr. ELLIOTSON and M. CRUVEILLIER's cases presented symptoms which merely led to a belief in the existence of organic disease of the heart. In one of the two cases, recorded in the catalogue of the preparations of the anatomical department of the army, M. REYNAUD complained of cough, dyspnoea, oppression in the chest, and hæmoptysis; in the other, the symptoms were not ascertained. TALMA died of stricture, amounting nearly to obliteration of the rectum. The aneurism of the left ventricle was small and filled with concentric layers of fibrine. It was remembered that long previously, after having enacted the part of Orestes, in the play of Andromache, TALMA felt himself strangely agitated, anxious, and restless for some time; but these symptoms gradually subsided. It was supposed that the internal membrane, or some of the fibres of the muscular structure, had then given way, the consequent effusion of coagulable lymph producing a partial and temporary cure. Others of the cases upon record have been equally obscure: whilst some have been attended by palpitations, urgent dyspnoea, cough, and short breathing; anxiety, pain, and constriction at the præcordia; weak, irregular, or intermittent pulse; inability to lie otherwise than on the back; sudden starting up from sleep, oedema of the extremities, &c.

198. *c.* Dilatation of the orifices gives rise to

no indications of its existence, unless it is so considerable as to permit a reflux of the current of blood; and even then the signs are equivocal. This reflux is one of the causes of the bellows-sound, and of the purring tremor. When it takes place through the right auriculo-ventricular orifice, it causes a venous pulsation, particularly in the jugulars.

199. *D. Progress, Termination, and Prognosis of Expansion of the Heart.*—The progress of dilatation entirely depends upon the nature of the pathological condition, or antecedent disease, of which it is a more or less immediate consequence. A slight degree of expansion, depending chiefly on original conformation, and accompanied with a delicate constitution and thin muscles, may subsist long, or remain stationary for years, without occasioning much disorder beyond dyspnoea, shortness of breath, and palpitations on exertion, or slight asthmatic disorder; but when dilatation is consequent upon a permanent or increasing obstacle to the circulation, or is associated with adhesions of the pericardium, the symptoms are more severe, more rapid in their progress, and attended with evidence of general cachexia. When dyspnoea becomes urgent, or oedema or dropsical effusions take place, or when pulsation of the jugulars is observed, the disease is generally rapid in its progress, especially if exasperated by exertion, mental disquiet, or attacks of fever, &c.; although judicious treatment, by repeatedly procuring the removal of effusions, will often prolong life a considerable time. Much, however, will depend upon the age, strength, constitution, and previous state of the patient. Upon the above considerations the prognosis must entirely depend.

200. *E. TREATMENT OF Dilatations of the Cavities and Orifices, with Attenuation of their Parietes.*—The first object is to ascertain the exciting or pathological cause of the dilatation, and to remove it as much as possible. When the cause consists of disease of the valves or orifices impeding the circulation, it is difficult, if not impossible, to effect this object, yet it ought not to be left unattempted; but when the cause is of a less permanent kind, as peripneumony, spinal curvatures, pertussis, asthma, bronchitis, hydrothorax, emphysema of the lungs, &c.; or when the dilatation has been produced by laborious occupations, constrained postures, strait lacing, playing on wind instruments, &c.; this intention ought never to be overlooked; for, if the expansion have not proceeded so far as to deprive the muscular structure of the organ of its resiliency, a more or less complete restoration of the dilated cavity may be effected. Even when it is impossible to restore the organ to its healthy state, an increase of the dilatation may be prevented, and the patient's life may be prolonged to the usual limits.

201. The greatest attention should be paid to diet and regimen, as well as to the selection of medicinal agents; and both classes of means ought to be directed to the support of vital power. With this view, vegetable and mineral tonics may be prescribed, with aromatic, antispasmodics, and anodynes, according to circumstances. Small doses of quinine may be given with camphor and hyoscyamus, or of the sulphate of iron or of the sulphate of zinc, with the extract of hop. Valerian, assafoetida, the compound galbanum pill, or the compound iron pill, may also be exhibited in

similar forms of combination; or either of the alkaline solutions in use may be given with chalybeates, or with tonic infusions or decoctions. Where there is any obstacle to the circulation, referrible either to a morbid state of the lungs, or to diseased valves, the fixed alkalies, or the subborate of soda, with tonics, will be found of much service. If there exist pulmonary congestion, with copious and difficult expectoration, the decoction of *senega root*, with an aromatic water, and small doses of camphor, will be productive of benefit. If attacks of dyspnoea or of asthma take place, and if the dilatation be complicated with emphysema or with oedema of the lungs, this combination will be of use; or camphor, ammonia, assafoetida, ammoniacum, the æthers, &c. may be exhibited in forms, which the peculiarities of the case will indicate. At the same time, the surface of the body should be kept warm, and derivatives applied to the extremities, fresh air being freely admitted into the patient's apartment.

202. The utmost attention ought always to be paid to the state of the digestive organs. The secretions and excretions should be promoted; those of the liver and bowels being freely evacuated by an occasional dose of the blue pill at night, and of a stomachic aperient the following morning. Flatulent distension of the stomach and bowels, and acidity, should be especially guarded against, and removed by the means suggested in the article FLATULENCY (§ 15. *et seq.*); for these states of disorder remarkably aggravate both functional and organic affections of the heart, as shown in the article just referred to (§ 8.).—The circulation ought to be kept tranquil by moral and physical quietude, and by a light, nutritious, but not heating, diet. In order to preserve a free state of the cutaneous function, and to prevent catarrhal affections, flannel should be worn next the skin, and the feet kept warm by woollen stockings. Febrile and inflammatory affections, and particularly inflammations of the lungs and bronchi, as Dr. HORE very properly advises, should be sedulously guarded against, by adopting these and other means, and promptly treated when they occur.—But even in these circumstances, I would avoid, bloodletting ought to be resorted to with extreme caution, and rarely or never by venæsection. In all cases of expansion of the cavities of the heart, the organ is unable to accommodate itself to large or sudden losses of blood, and hence a fatal collapse may be the result of the abstraction of this fluid. If the contingent pulmonary congestion should render vascular depletion an appropriate remedy, a small quantity only ought to be taken away, and always when the patient is in the recumbent posture, restoratives and external derivatives being also resorted to.

203. If the expansion has followed low or adynamic fevers, or has been caused by venereal excesses or masturbation, or by non-inflammatory softening or relaxation of the muscular structure of the organ, as in cachectic, chlorotic, or scorbutic constitutions, tonics are especially requisite; particularly the preparations of iron, the tincture of the muriate of iron, and chalybeate mineral springs; residence in a pure and dry air, and light nourishing food. The vegetable tonics with the alkaline subcarbonates, or preferably with the vegetable or mineral acids, especially the muriatic, the nitro-muriatic, and the acetic, will

also be of service, according to the state of antecedent and concomitant constitutional disease.

204. When disease of the valves and orifices of the heart, or any other obstacle to the circulation, of which dilatation is a consequence, has proceeded so far as to have also occasioned dropsical effusions, treatment is seldom productive of more than temporary benefit. The means which promise the greatest advantage, especially when effusion has taken place, are so fully stated in the article DROPSY (§ 45—47.), that I need not particularise them at this place.—If permanent dyspnoea, emphysema of the lungs, increased exudation into the bronchial tubes, and difficult expectoration, be associated with this state of cardiac disease, *expectorants*, especially the decoction of *senega*, the balsams, camphor, ammoniacum, &c., with opium, will be of service.

205. In addition to strict attention to diet and regimen,—the former consisting chiefly of light animal food, in moderate quantity, and the more farinaceous vegetable substances; the latter of mental and bodily quietude,—the patient should reside in a dry, bracing, temperate, and equable climate, and in large well-ventilated apartments. He should observe early hours, and, as his health improves, take very gentle exercise in the open air. The cold or salt water bath, or the shower-bath, will also be of service, if directed with caution and discrimination.—In this, as well as in all other affections of the heart, bulky, flatulent, and acescent vegetables should be avoided; and that kind of food preferred which is found to be most easy of digestion. Recourse may be had to chalybeate or other strengthening mineral waters, as convalescence advances. Admitting it possible that *partial dilatation or aneurism of the cavities*, and that *dilatation of the orifices* of the heart, may be detected during life,—a circumstance not likely to occur in respect of the former lesion especially,—the treatment will not vary from that which has been now recommended.

iii. ATROPHY OF THE HEART—Cardiac Consumption.

206. CHARACT.—*Diminished size or u of the heart, the actions of the organ being limited in extent, and attended by a confined impulse, and by lessened percussion in the præcordia.*

207. A. The heart may be unusually from original conformation, or from disease.—a. Many of the instances of extreme smallness of this organ on record are referrible to the former cause. Those adduced by MORGAGNI (*Ep. lxx. 5.*), LIEUTAUD (vol. ii. obs. 453.), BURNS (*Op. cit.* p. 110.), KREYSIG (b. ii. p. 468.), OTTO (*Compend. of Comp. Anat.* p. 264.), and others, are of this kind. The majority of those referred to by LIEUTAUD and PLOUQUET (*Med. Digest.* art. *Cor—parvum*) are stated so loosely by their respective authors, as to be almost devoid of interest. OTTO thinks that a disproportionate size of the heart to the whole body is sometimes hereditary; and that, when it is congenital, it is often connected with other vicious formations of the organ, or with general weakness and imperfect developement. If a really small heart be fleshy, firm, and red, and its compartments in due proportion to one another, it may be considered as a vice of conformation.

208. b. *True atrophy*, or diminution of the

heart from disease, is rarely observed in a remarkable degree. Slight grades of it are, however, not uncommon, especially in wasting diseases, as phthisis, mesenteric obstructions, and chorea, although the atrophy of this organ is not so considerable, nor so rapid, as in other muscles. ORRO attributes this to the want of cellular tissue between the muscular fasciculi.—PORTAL, TESTA, and KREYNO suggest, that the seeming diminution, caused by the violent contraction of the organ, at the time of death, should not be confounded with atrophy of it. True atrophy is accompanied with attenuation, softness, or paleness, or hardening of the structure, or with a shrivelled or wrinkled appearance of the surface of the viscus. It may be so considerable as to reduce the organ to one half or one third its natural weight. M. CHOMEL found the heart not larger than a hen's egg in a man who died in the hospital *La Charité*. As respects its form—1st. One or more of the compartments are attenuated without any change in their capacities, the heart being but slightly diminished in bulk;—2d. With attenuation there is much more rarely diminution of the capacities of the chambers, the organ being very much lessened in size;—and, 3d. With diminution of the cavities, the parietes may be of the natural thickness, or even above it: this is the most frequent form of atrophy.

209. B. The Causes of atrophy of the heart are—1st. *Local*;—2d. *Moral*;—and, 3d. *Constitutional*.—*a*. Of the first, the most common are compression arising from the pressure of matters effused into the pericardium, or from tumours developed in the mediastinum, and constriction or other changes of the coronary arteries, especially ossific deposits in their coats, &c. I doubt, however, the influence of compression from these causes, as the heart is very rarely found atrophied where the greatest amount of effusion has existed in the pericardium. In the case referred to below, where there obviously is extreme atrophy from local causes, the previous effusion never led to have been very great.*—*b*. The moral consist of mental anxiety, and all the de-

qually singular:—A girl, at the age of 15, was affected with rheumatism of the joints on two subsequent occasions at considerable and irregular intervals; and, in the second and third attacks, the cartilages of the left ribs were pushed outwards by the effusion into the pericardium. A mercurial treatment was prolonged; recovery seemed more complete, and the case was dismissed. About eight or nine months afterwards, this child was brought to me with the lower half of the sternum, and the cartilages of the left ribs, which were formerly protuberant, drawing backwards towards the spine, so as to form a deep and large depression in this situation, and scarcely to leave sufficient space for an atrophied heart to lie between the spine and the depression. The epigastrium was drawn inwards, and upwards, on each contraction of the ventricles. In this case, which was seen also by some of my colleagues at the Middlesex Hospital, the repeated attacks of pericarditis had given rise to adhesions of the pericardium to the heart, and probably also to the pleura; to this atrophy had succeeded, and the sternum had been drawn inwards with the wasted heart. This child was, even in this state, much recovered. She could take gentle exercise. The heart did not present any morbid sound, at this period; but there was well-marked epigastric pulsation, of a confused kind, probably owing to the pressure of the heart on the aorta. She was alive and able to be about when this was written.

pressing passions, particularly when their action has been prolonged.—*c*. The general causes are whatever arrests the nutrition of muscular structures; and yet the heart seldom participates in the change of these parts, or only in a slight degree. In the diseases just mentioned (§ 208.), more or less atrophy is sometimes met with; but it seldom bears any relation to the wasting of the voluntary muscles. In a case of tubercular consumption, in which death occurred instantaneously, before ulceration had commenced, and before emaciation had become considerable, the heart was small and flabby, and the parietes of the ventricles somewhat attenuated. The most marked cases of atrophy which I have seen were in persons who had died after attack of chorea and chlorosis, and after hypochondriasis and distress of mind.

210. C. The Symptoms are seldom such as to indicate, with tolerable certainty, the existence of atrophy of the heart, unless it be very considerable. In this case, the impulse is weak, limited, or small; the sounds are indistinct, or faint, in proportion as the cavities are diminished in capacity; and there is little or no dulness on percussion. The pulse is small, thready, and often frequent; and there is commonly marasmus, and loss of colour. Yet emaciation can hardly be reckoned as a sign of atrophy, as it not infrequently accompanies hypertrophy of this organ.

211. D. The Treatment of this lesion should be directed—1st, to the removal of the causes, as far as it can be accomplished; and, 2dly, to the restoration of the healthy nutrition of the organ. The latter of these intentions will be best accomplished by attention to the digestive and assimilative functions, and by the use of chalybeate medicines and mineral waters, with suitable exercise in a dry and temperate air; and the other means recommended for functional disorders (§ 50—53.), for softening (§ 221.), and for dilatation (§ 200.) of the heart.

212. IV. CONTRACTIONS OF THE CAVITIES AND ORIFICES OF THE HEART.—A. Diminution of one or more of the cavities arises—1st. From concentric hypertrophy of the parietes (§ 158.);—2d. From atrophy of the heart (§ 208.);—3d. From the pressure of tumours, or of effused fluids, on one or more of the compartments of the organ;—and, 4th. From concretions of lymph or of fibrine, recent or organised.—The first, second, and third of these morbid states have received attention at the places referred to; the fourth will be fully considered hereafter. From whatever of these causes the diminished capacity of the cavities arises, it is evident that very serious phenomena will result as soon as this lesion becomes so great as to materially derange the circulation, especially venous congestions, and serous effusions and infiltrations. When the cavity of the left ventricle is diminished, the pulse is small, as in narrowing of the aortic orifice.

213. B. Contraction of the orifices of the heart may proceed from the same changes as produce diminution of the cavities; but it most frequently is a more or less immediate result of internal carditis, and attendant upon induration of the valves. As such it has already been considered, when treating of the chronic states of endocarditis (§ 66, 67.).

214. C. The Treatment of diminished capacity

of the cavities is rarely followed by any benefit. The changes producing it manifestly are beyond our resources. This remark is nearly applicable to contraction of the orifices. The means, however, which may be employed, should depend upon the cardiac lesions, and the symptomatic changes consequent upon this alteration of the orifices and valves. If *hypertrophy* have become associated with it, the treatment advised in the chapter on this lesion (§ 182.), according to the form it may assume, will be appropriate. If *expansion* of the cavities have taken place, the means prescribed under that head will be requisite (§ 200.).

215. v. OF ALTERATIONS OF THE COLOUR AND CONSISTENCE OF THE HEART. — *A.* The colour of the heart may vary, or be irregular, both on its surfaces and in its substance. One or more *white* specks, or patches, of different sizes, are often found. They are produced by a slight inflammation, causing thickening and opacity of the membrane, and are seated in either the internal or external surface. The structure and external surface of the organ are often *paler* than natural in cachectic, dropsical, and leucophlegmatic habits; and are sometimes of a *pale yellow* in these habits of body, and in hearts which are preternaturally fat. In inflammation, and in hypertrophy, this organ is *redder* than usual. In softening, suppuration, mortification, and other organic lesions, it is often spotted, of a *greyish, light, or dark brown*. Sometimes the internal surface, in one or all the cavities, is *reddened* throughout by the imbibition of the colouring matter of the blood; and a similar discolouration of the external surface has been observed to follow from the transudation of blood, and from hæmorrhage into the pericardium. ORRO found the heart tinged with green in a case of poisoning with stramonium seeds.

216. *B.* Alterations of consistence have already been partially noticed (§ 113—115.); but chiefly as consequences of inflammation. — *a.* *Softening* of the heart is not infrequently found in persons who have died of low fevers, malignant diseases, and it then occurs in advanced stages of these maladies; but it is also met with under other circumstances. It presents two forms — one the result of inflammation (§ 113.), generally with asthenic characters; the other seemingly in no ways arising from inflammatory action, but rather from impaired organic nervous or vital power, and insufficient nutrition of the organ. — In the former, the softening is most commonly attended by a deeper tinge of colour, or discolouration; and the substance of the heart is not wasted, or is even more bulky than natural; signs of antecedent inflammation being usually present either in the internal or in the external surface, or even in the substance of the organ itself. In the latter form the heart is paler, as well as softer, than usual, — is easily broken down, — and frequently the cavities are somewhat dilated; but there is rarely any other distinct vice of structure. In a few extreme cases, the muscular fibres present a sort of fish-like structure, especially in young chlorotic and leucophlegmatic persons.

217. The non-inflammatory form of softening is met with chiefly under the circumstances just mentioned, and in fatal cases of scurvy, purpura, chorea, dropsy, and *anæmia*. In all these I have seen

it, as well as in mesenteric decline, and tubercular consumption. It is occasionally associated with an inordinate deposition of fat around the organ; this latter being generally attended by a relaxed, pale, softened, or atrophied state of the muscular structure of the heart. In persons who have died suddenly, and without any distinct cause, the heart is sometimes soft, flabby, and even bloodless. Cases of this kind are recorded by Mr. CHAVALIER, and by my friend Mr. WORTHINGTON (*Lond. Med. Reposit.* vol. xvii. p. 361.). An instance also recently occurred in my own practice. In the softened state of the heart found in low fevers and in other contaminating diseases, there is also observed, more or less dark discolouration of it. Violent exertion diminishes the vital cohesion of this organ, as well as of other muscles, deepens its colour, and causes it to be easily broken down. SENAC and ORRO found it very soft in hunted deer. This alteration is probably increased by the effect which an inordinate acceleration of the circulation produces upon the fibrine of the blood, as shown by HALLER and others. (See art. BLOOD, § 134.)

218. *b.* The *Symptoms of softening* entirely depend upon the proximate cause. If it arise from inflammation, then it is generally attended by the signs and symptoms of an associated *endocarditis* or *pericarditis*. If it be accompanied with *dilatation*, more or less of the phenomena attendant upon that lesion may be expected. In its simple or non-inflammatory states, there are generally great languor and debility; a soft, quick, weak, feeble, and small pulse; frequent faintings; a sallow, pale, faded, or tallowy complexion; passive cedema of the extremities, and sometimes of the countenance; the sounds of the organ being dull and obscure, and the impulse weak or nearly gone. As this lesion is often attended by effusion into the pericardium, the sounds and impulse will be further obscured by this circumstance; and the sphere of dulness on percussion extended accordingly. When it is not thus associated, the faint sounds and impulse of the heart will not be attended by greater dulness on percussion than natural. (See also the *eye cut* on *Inflammations* (§ 121.) and on *Induration* (§ 196.).

219. *c.* *Induration of the heart* is a remote consequence of inflammatory (§ 119.), and is more rarely observed than the opposite lesion. It is often simulated by an unusual contraction at the moment of dissolution. In hypertrophy, also, the heart is firmer than natural, but not to amount to a morbid induration, so as to afford great resistance to the scalpel, or to cause a crepitation on dividing it. — Induration may occupy the whole of a ventricle, or only part of it; and it may accompany other lesions, or alterations of the organ as to size. It is evidently the consequence of altered nutrition, and is different from the firmness observed in hypertrophy, as well as from the cartilaginous and osseous hardening of portions of the organ sometimes consequent upon inflammatory action (§ 120.).

220. *d.* Of the *Signs and Symptoms* of this lesion, nothing positive is known. LAENNÉC supposed that, in its slighter grades, the impulse of the heart was increased; and CORVISART thought that, beyond a certain point, it rendered the

contractions of the ventricles more difficult, and their movements more confined.

221. *e.* The *Treatment* of alterations of the consistence of the heart should be directed according to the evidence of these changes that may exist, and to the associated cardiac and symptomatic changes. In *softening*, we must depend chiefly upon the exhibition of tonics, especially quinine, cinchona, mineral acids, &c., or upon the tincture of the muriate, or the sulphate, or the other preparations of iron, pure air, and the means recommended for dilatation (§ 200.). If it were possible to ascertain the presence of *induration* of the heart, but little could be hoped from medical means. Those advised for *hypertrophy* (§ 182.) are, perhaps, the most appropriate.

222. *vi.* OF SEROUS AND SANGUINEOUS INFILTRATIONS OF THE HEART.—*A. Infiltration of Serum into the Cellular Tissue of the Organ—(Edema of the Heart, BOUILLAUD—*is very rarely seen. This writer, however, describes it as follows:—The cellulo-adipose tissue enveloping the viscus presents the form of a tremulous, gelatiniform mass; from which exudes, upon pressure, a liquid, transparent serum, which is sometimes colourless, and occasionally of a yellowish green tint. The cellular tissue which is thus infiltrated is of a dull white, or opaline hue, as if macerated by the contained fluid.—This alteration may accompany other dropsical maladies, or cachectic states of the system; but it is referred, by M. BOUILLAUD, chiefly to a varicose state of the coronary veins, consequent on the difficult passage of the blood from them into the right auricle. Obliteration of some of the cardiac veins will occasion this lesion; but it has hitherto not been described.

223. *B.* The *Exudation or Infiltration of Blood into the cellular tissue of the heart—Cardiac Hæmorrhage*—has been also met with, but very rarely, and chiefly in the form of *petechie*, or small *ecchymoses*. One or two instances of a more copious hæmorrhage into the substance of the organ, so as to form a distinct hæmorrhagic *apoplexy*—*Apoplexy of the Heart*—have been recorded.—*Petechie* and *ecchymoses*, principally of the surfaces of the organ, have been recorded by FAIRBAIRN, and OTTO. I met with hæmorrhage in a case of purpura hæmorrhagica, and in another of scurvy. In these diseases, and in the putro-adynamic states of fever, I believe that it is not very uncommon. OTTO (*Comp. of Path. Anat.* § 177. p. 278.) states, that he met with effusions of blood, in various parts of the heart, in a case of petechial fever; also in a person killed by fire-damp, and in a child who died of hooping-cough. In a case of violent inflammation of the heart, he found small extravasations of blood under the outer membrane. Dr. FAIRBAIRN (*Trans. of Med. and Chirurg. Soc. of Edin.* vol. ii. p. 157.) observed effusions of blood under the inner membrane of the heart in a case of purpura; and CRUVEILHIER (*Anat. Path.* livr. xxii. pl. 3.), saw the same lesion in the substance of the left ventricle. The exudation and effusion of blood into the pericardium has received attention in the article HÆMORRHAGE (§ 276.).

224. *vii.* OF FATTY DEGENERATIONS AND OBESITY OF THE HEART.—The *fatty degeneration of the structure of the organ* is not to be

confounded with an *excessive deposition of fat* between the pericardiac covering and the substance of the heart, frequently met with in corpulent persons.—*a. Excess of fat in this viscus* is often accompanied with a flabby, softened, and attenuated state of the parietes. In these cases, the adipose substance often penetrates to some depth between the muscular fibres.—The symptoms attending this state of the organ cannot be referred so much to the accumulation of fat—to the *obesity of the organ*—as to the change in the muscular parietes attending it; both alterations being results of weakened organic nervous energy, and of, consequently, impaired assimilation.

225. *b.* The *true greasy degeneration* is a transformation of the muscular substance of the organ into a fatty matter similar to that first described by HALLER and VICQ D'AZYR as occurring in the muscles. This lesion is generally confined to a portion of the parietes. LAENNEC and ANDRAL met with it only at the apex. Dr. HOPE found the greater part of both ventricles thus degenerated, the colour being that of withered leaves. More rarely, the substance of the heart has the appearance of lard, as remarked by CORVISART, BURNS, DUNCAN, CHEYNE, LUCKETT, and CHOMEL; the less altered portions in these cases are not only soft and flabby, but they also have an oily aspect.

226. *c.* Both these forms of fatty degeneration sometimes nearly approximate. M. ANDRAL remarks that, most frequently, the muscular fibres are not really converted into fat, but are only atrophied by the excessive deposition of fat between them; yet, in some cases, they seem to have undergone this change, as they grease both paper and the scalpel, owing to an oily matter infiltrating them. That the atrophy of the muscular substance is not a mere consequence of the accumulation of fat, as ANDRAL and others suppose, and that both changes are joint consequences of impaired vital power and imperfect assimilation, are satisfactorily shown by the circumstances under which they occur—by their being met with only where these primary pathological conditions exist, especially in aged persons, and by their having been found in connection with an excessive quantity of oil in the blood; the increase of this fluid in the circulation being a manifest result of impaired assimilation. Mr. SMITH (*Dub. Journ. of Med. Science*, vol. ix. p. 412.) has detailed two cases in which this connection was observed; and one recently fell under my own observation. In Mr. SMITH's cases, globules of limpid oil floated on the surface of the blood; in my case, the serum was remarkably milky, from the quantity of fat it contained.—From the history, and the alterations found on dissection, of two cases detailed by Dr. DUNCAN (*Edin. Med. and Surg. Journ.* vol. xii. p. 65.) and by Dr. SIMMONS (*Heidl. Klinisch. Ann.* t. iii.), it appears that inflammation of the heart may terminate in the true fatty degeneration of the muscular substance of the organ.*

* It may be interesting to subjoin the particulars of a few of the cases of this lesion which have been put upon record.

1. A young married woman was seized, ten days before coming under Dr. DUNCAN's care, with rigors, followed by great anguish and pain under the sternum, with jactitation, want of sleep, rheumatism of the joints, pleuritic pains in the chest, cough, expectoration, dyspnoea, in.

227. *d. Of the Signs of Obesity and Fatty Degeneration of the Heart* little can be stated with confidence. Many writers suppose that the accumulation of fat, together with the softening of the muscular substance, embarrasses the organ, and ultimately arrests its action. BOENHAUSEN thus accounted for the sudden death of a person whose heart was found loaded with fat. PORTAL (*Anat. Med.* t. iii. p. 75.) believed that obesity of the heart produces palpitations, dyspnoea, asthmatic affections, and even sudden dissolution; and BONET, SENAC, and FOTHERGILL entertained similar opinions. — It has been also supposed that the softening and attenuation of the muscular substance attending the excessive deposition of fat in this organ, dispose to perforation or rupture of it. MORGAGNI and BOUILLAUD have recorded cases which favour this view.

ability to lie down, followed by oedema of the extremities, the pulse having become weak, soft, and small. The treatment was antiphlogistic for some time after her admission into the hospital (on the eleventh day of the disease), and subsequently palliative. — She died six weeks after the attack. — On dissection, the pericardium was found universally inflamed, and firmly adherent to the heart. The lungs were agglutinated to the pericardium, and to the costal pleura. The heart was enlarged, and thickly covered with coagulated lymph, by which the pericardium adhered to it. Under this lymph, about two thirds of the structure of the heart was changed into condensed fat, which melted, stained paper, and swam in water: the remaining third had almost lost its muscular appearance. — The columnar carnes, in both the ventricles, were larger than natural. Ossific deposits were found in the aortic and mitral valves.

2. A gentleman, aged sixty, who had experienced attacks of gout, and had lived fully, was struck with apoplexy; for which he was treated, by Dr. CHURCH, in the usual manner. His pulse, however, continued extremely unequal and irregular; dropsy supervened; and he died, some weeks afterwards, of a recurrence of the apoplectic seizure with hemiplegia. — On dissection, the heart was found greatly hypertrophied. The lower part of the right ventricle was converted into a soft fatty substance; the upper part was remarkably thin, and gradually degenerated into this substance. The whole substance of the left ventricle, with the exception of the internal reticulated structure and columnar carnes, was converted into fat, the cavity being greatly enlarged. The valves were sound. The aorta was studded with acetabular and earthy concretions. The principal peculiarity in the symptoms was the state of the respiration, which was irregular, and often suspended for a quarter of a minute. (*Dublin Hosp. Reports*, vol. ii. p. 216.)

3. Mr. ADAMS (*Ibid.* vol. iv. p. 396.) has detailed the case of a man, aged sixty-eight, of a full habit of body, who was subject to cough, and frequent attacks of an apoplectic nature. His breathing was irregular, and his pulse about thirty in a minute. He died from an apoplectic attack. — On dissection, the right auricle was much dilated. The right ventricle seemed composed of fat, of a deep yellow colour through most of its substance. The reticulated lining of the ventricle, which, here and there, allowed the fat to appear between its fibres, alone presented any appearance of muscular structure. The left ventricle was very thin, and its whole surface was covered with a layer of fat. Beneath this the muscular structure was not a line in thickness, and was soft, easily torn, and like liver. The septum of the ventricles presented the same appearance. In both ventricles, even in the lining fibres, yellow spots were seen, where fat had occupied the place of muscular structure. The whole organ was very light. The valves of the aorta were partially ossified.

4. A girl, during arthritic rheumatism, complained of various symptoms, many of which were referable to the heart. Intermitting heat, with coldness of the surface, suppressed menstruation, cold perspirations, very feeble action of the heart, were complained of. Death took place after ten months. — On dissection, the lungs were found adherent to the pericardium and costal pleura. Yellowish white filamentous adhesions existed between the heart and pericardium. Two thirds of the muscular substance of the organ was converted into a greyish yellow mass of fat. (Dr. SIMON'S *Op. cit.* Heidl. 1827.) — See, also, Dr. ELLIOTSON'S *On Diseases of the Heart* (p. 32.), and the two cases recorded by Mr. SMITH, in which free oil was seen in the blood; and in one of which, also, softening and rupture of the left ventricle were observed.

In one of the two interesting instances adduced by Mr. SMITH, the sudden death was owing to rupture of the left ventricle. KREYSIG remarks that, more commonly, obesity of the heart gives rise to no symptoms by which its existence can be inferred during life. M. CUOMEL, however, thinks that it often occasions dyspnoea and palpitations, and very probably faintings, or sinking; an irregular, weak, soft, small, and slow pulse; and anasarca, or oedema of the extremities, may also be produced by it.

228. *e. An excessive deposition of fat under the pericardium*, according to M. BIZOT, is much more frequent in females than in males. He found, in 44 of the latter, the heart very much loaded with fat in 4; but, in 42 of the former, it was equally charged in 23 cases. That the accumulation of fat around the heart is not necessarily connected with, nor dependent upon, general obesity, is shown by the circumstance of 29 of the female cases having been thin or emaciated, and yet of these there were 14 instances of obesity of the heart. Of 13 females of a full habit, 9 presented an accumulation of fat around this organ. In 25 phthical females, M. BIZOT found a maximum deposition of fat in this situation in 11 cases, a medium quantity in 11, and complete absence of it in 3. In 11 phthical men, this deposit was wanting in 6, and very scanty in 5. (*Mém. de la Soc. Méd. d'Observat.* t. i. p. 351.) I have observed an unusual accumulation of fat around the heart most frequently in habitual drunkards.

229. *f. A morbid deposition of fat* has likewise been observed on the external surface, and between the layers of the pericardium; sometimes to the extent of producing an injurious pressure upon the heart and great vessels; and even sudden death. Instances of this change have been noticed by BONET, SENAC, GODART, MORGAGNI, MECKEL, TESTA, PARRY, BLACK, KREYSIG, and HORN. That this deposition is entirely independent of general obesity, is confirmed by the remark of OTTO, who states, that he has met with it although there was meagreness of other parts of the body. Fatty deposits on the pericardium have been incorrectly considered as causes of aneurysm of the pectoris, by FOTHERGILL. When, indeed, they are only contingently associated with aneurysm, with neuralgia of the heart, in rare instances, and

230. *g. The Treatment of this lesion*, in cases where the above indications, conjoined with a leucophlegmatic and corpulent state of the frame, render its existence probable, consists in whatever will improve the digestive and assimilative functions and the organic nervous energy. Tonics, chalybeate preparations; iodine, or iodine with iron; stomachic aperients; regular exercise in a dry open air; and abstinence from fat, oily, or rich articles of diet, and from stimulating beverages, especially spirituous and fermented liquors; constitute the chief means of cure—if, indeed, a cure be practicable.

231. viii. OF ADVENTITIOUS FORMATIONS IN THE HEART AND PERICARDIUM. — *A. Of Earthy and Ossific Depositions*, little remains to be added to what has been already advanced, when considering them as occasional terminations of chronic inflammation (§ 119, 120.). But calcareous phosphates are sometimes deposited in circumstances which are by no means conclusive of the presence of inflammatory action, particularly in

aged persons, and when other consequences of this action are not observed.—*a.* In many cases, a whitish patch appears, either in the fine cellular tissue uniting the enveloping membrane to the heart, or between the reflections of the internal membrane composing the valves, increases in thickness, and assumes more and more the characters of cartilage, especially in the latter situation. The morbid secretion giving rise to this patch ultimately becomes the seat of osseous or earthy deposits. M. ANDRAL divides the ossiform formations found in the heart into *three species*, as they are seated in the cellular, fibrous, or muscular tissue.—(*a*) That in the *cellular tissue* is the most common, the portion of it uniting the reflections of the internal membrane to the fibrous structure of the orifices and valves being most frequently thus altered. The calcareous phosphates are deposited in the cellular tissue, in minute grains, or in considerable masses, separating and compressing the surrounding textures. They are more rarely met with in the tissue connecting the muscular fibres; and they there form either isolated masses, or are connected with the deposits formed around the orifices.—(*b*) The *fibrous tissue* frequently also becomes the seat of the osseous deposit, and chiefly in three points:—1st. In the tendinous zone encircling the left auriculo-ventricular orifice;—2d. In the fibrous structure of the valves;—and, 3d. In the tendons of the mitral valve.—(*c*) The third species is the most rare. Indeed, it is doubtful whether the *muscular fibre* ever becomes the seat of this alteration. It seems more probable that the deposits, in the connecting cellular tissue, by their bulk, compress or partially destroy the muscular structure, than that this structure is converted into bone. The rare instances on record, especially those adduced by BURNS, RENAULDIN, and others above referred to. (§ 119.), are most probably merely proofs of the partial destruction of the muscular tissue in the seats of the excessive osseous or calcareous formations.

232. *b.* The *pericardium* very rarely presents patches of the cartilaginous and osseous transformation. Instances, however, of the former have been recorded by KERRICH, RIOLAN, HAUTEFEOULLE, SAVIARD, OTTO, and TESTA; the latter have been observed by AURIVILLIUS, SAVIARD, WALTER, HALLER, PASTA, SENAC, PROST, RAYER, LAENNEC, and ABERCROMBIE, in the fibrous or in the serous layer.—Fibro-cartilaginous and osseous concretions are still more rarely found loose in the cavity of the pericardium. They have been detected only by LANZONI and OTTO; and have probably had their origin in peduncular tumours, which had subsequently been broken off.

233. *c. Signs.*—LAENNEC supposed that cartilaginous or osseous formations in the substance of the heart may be recognised, when very considerable, by an augmentation and modification of the sound. That a morbid sound will be heard when the orifices and valves are implicated, cannot be disputed; but the phenomena consequent upon these changes, when confined to the body of the organ, have not been observed with any precision. In a case noticed by M. ANDRAL, the suppositions of LAENNEC were not confirmed. It is unnecessary to add that these lesions are altogether beyond the reach of treatment.

234. *B. Tubercular Formations* have been very rarely found in the muscular structure of the heart. M. LAENNEC met with only three or four cases; but OTTO and BOUILLAUD never saw one. M. ANDRAL remarks, that the heart is one of the organs in which tuberculous deposits are most rarely observed. Instances, however, are recorded by HILANDUS, BONET, MORGAGNI, PORTAL, AUTENRIETH, SPENS, LAWRENCE, HAYLE, MACMICHAEL, and ELLIOTSON, at the places referred to below. In a man, aged 34, who complained of pain in the chest, cough, inability to remain in the recumbent posture, and subsequently of irregularity of pulse and palpitations, hypertrophy of the left ventricle, and tubercular formations in the muscular structure, were found after death. (*Cat. of Prepar. in Museum Fort Pitt, &c.* p. 38.) In an aged man, who died of pulmonary consumption (*Dub. Med. Journ.* 1833), a tubercular mass was found in the parietes of the left auricle obstructing the trunks of the pulmonary veins. M. SAUZIER detected, in a man who died of tubercular disease of the lungs, pancreas, &c., tubercles in a crude state in the walls of the auricle, the pericardium being adherent in the situation where they existed. Most of the cases of this lesion on record have occurred in persons who were labouring under extensive tubercular disease of the lungs and other organs: many of them have not been observed with any degree of precision; and the anatomical descriptions have generally been very loosely given.—Tuberculous productions have been found also in the internal surface of the *pericardium*, by MUSGRAVE, HALLER, VOIGTTEL, BAILLIE, OTTO, and others.

235. *C. Watery Cysts and Hydatids* have been detected both in the substance, and on either of the surfaces, of the heart.—*a.* Simple cysts have not infrequently been confounded with hydatids; the former having been described as instances of the latter formation, especially some of those mentioned by BONET, RUTTY, MORGAGNI, HUERMANN, SALZMANN, CLOSSIUS, and others. PORTAL found several hydatids on the base of the heart; MECKEL and BERNHARDI, large hydatid sacs on the left ventricle; PRICE, a large single hydatid in the muscular substance, in a boy who died suddenly; ABERCROMBIE, a bag containing two ounces of albuminous fluid on the left auricle; and TROTTER, two hydatids within the right ventricle. It is, however, doubtful whether these were really cases of hydatids. From the imperfect account given of the most even of these, it may be inferred, that some of them, at least, were merely instances of serous cysts.—M. ANDRAL remarks, that these cysts vary from the size of a pea to that of a large hen's egg. They are most frequently found between the external surface of the heart and pericardium; but they are sometimes seen on the internal surface of one of the chambers. In other cases, they are not visible on either surface, and it is only on dividing the muscular structure that they are detected. M. DUPUYTREN saw a number of these cysts imbedded in the walls of the right auricle, and protruding a considerable way into its cavity. M. ANDRAL found a cyst, as large as a walnut, in the walls of the left ventricle, which were slightly hypertrophied. In another case, he detected one on the free surface of the lining membrane of the right ventricle, attached to it by a delicate pedicle

of the same texture as this membrane. Dr. ELLIOTSON mentions a case in which a number of globular cysts, containing a bloody fluid, were attached by pedicles to the fleshy columns.

236. *b.* Instead of simple cysts, true hydatids have been found in the heart, but in extremely rare instances in the human subject; they are more frequently met with, in this organ, in the lower animals. M. ANDRAL has often seen them in the hearts of measly pigs, and only once in the human heart. OTTO saw them protruding into the right auricle in one case; and in a man who died of diseased testes, he detected "a heap of hydatids on the Eustachian valve, hanging by several threads into the right ventricle." These, however, were probably only a cluster of simple cysts. Mr. SOUTH states, that, at St. Thomas's Hospital, there is a heart with a cyst on its apex, as large as a hen's egg, which was filled with hydatids. Watery cysts and hydatids have been found not only under that part of the pericardium reflected over the heart, but also either attached to the inner surface of the bag of the pericardium itself, or lodged between its layers.

237. *D. Tumours* of various kinds are noticed by the older writers as having been found in the substance of the heart. But, owing to their deficient anatomico-pathological knowledge, and to loose or defective descriptions, the exact nature of these is unknown. To these belong the cases recorded by RHODIUS, SCHENK, COLUMBUS, and BONET; and those collected by LIEUTAUD.—Tumours of a *mentomatous* nature have been observed by PFNADA, FLEISCH, SPRENGEL, and OTTO; and others, of a *melicerous* and *gritty* kind, by MORGAGNI, WALTFR, ARNDT, and CRUVEILLIER. OTTO states, that he has seen a flat gritty tumour in the substance of the right ventricle of an old woman; and five or six encysted tumours, the size of hazel-nuts, in the left ventricle of a young man. In an officer, who was the subject of chronic hepatitis, dropsy, &c., the slightest exertion producing severe palpitation, hurried and oppressed breathing, and a sharp irregular pulse, the heart was enlarged, and presented a large encysted tumour on the right auricle, the aorta being ossified at several points. (*Catal. of Prepar. in Mus. Fort Pitt*, &c. p. 36.)

238. *E. Sarcomatous Formations, and Medullary Sarcoma or Encephaloid Productions*, have also been found in both the heart and pericardium. OTTO remarks, that *sarcoma* occurs—1st, as single little roundish knots, deposited between the layers of the valves;—2dly, as white condylomatous growths on the inner surface, and especially on the valves;—and, 3dly, as spheroidal, smooth, tolerably large, and solid growths, or true sarcoms. The first is common; and instances of the second are recorded by LANCISI, BOXER, MORGAGNI, SANDIFORT, TESTA, LAFNNEC, DESRUELLES, &c. CORVISART, SCARPA, and some others, consider them of a syphilitic nature; whilst BEKTIN and BOUILLAUD controvert this opinion. OTTO states that he has met with them large, grape-like, or in the form of a cock's comb or cauliflower, both in syphilitic and in other persons. BOUILLAUD views these formations as the consequences of modified states of chronic inflammatory action. The third variety is most rare. It has been observed in either surface, and in the substance, of the heart, by FORLANI, BLANCARD, SOEMMERING, OTTO,

RIGACCI, NASSE, and others. MECKEL found fifteen of these productions, from the size of a pin's head to that of a hazel-nut, partly within, and partly without, the heart. TESTA found them in the heart of a person long afflicted with syphilis. Mr. SOUTH states, that, at St. Thomas's Hospital, on the interior of the right auricle of the heart of a man, who had a sarcomatous growth in the nostrils, there were two similar productions, one as large as a bean, the other as a pea.

239. *F. Medullary Sarcoma, or Fungoid Disease*, in modified forms, may implicate the heart or pericardium, or both. As in the case of tuberculous deposits, it is observed principally in cases, where this disease had previously appeared in other parts of the body. BARTZY found it on the anterior and upper part of the heart; SEGALAS D'ETCHPARE, in a boy; CRUVEILLIER, in an old man; OLIVIER, and several authors quoted by OTTO, in persons advanced in life. In all these, there were similar tumours in other parts, and the muscular structure of the heart was chiefly affected. When this disease is seated in either the posterior or the anterior mediastinum, the pericardium may be penetrated by it, and the heart itself implicated. This was observed in the case of a woman whose arm had been amputated on account of this malady (GERSON and JULIUS, *Magaz. der Ausl. Liter. d. q. Heilk.* September, 1823, p. 199.). The pericardium was involved in it, in a case which lately fell under my observation. The disease was seated in the mediastinum, and extended not only to the pericardium, but also to the sternum and ribs; its nature being recognised during life. In a case published by M. VETFAU, encephaloid tumours were found in the substance of the heart, in the lungs, between the pleura and ribs, in the bronchial glands, under the mucous membrane of the stomach, in the duodenum, in the pancreas, and right kidney, in the liver to the number of some hundreds, between the tunics of the gall-bladder, in different parts of the peritoneum, on the upper surface of the brain, in the thyroid gland, and under the skin, and in the muscles of the right thigh. The aorta also was completely obstructed by fungoid masses.

240. M. ANDRAL twice saw this disease on the right side of the heart. In the first case, the patient presented signs of hypertrophy of the right ventricle. In addition to this, almost the entire of the right ventricle and auricle were converted into a firm, dirty white substance, traversed by a number of reddish lines, and possessing all the characters of the encephaloid substance. The second case was that of a man of middle age, who had enjoyed good health till two years previously, when he became slightly asthmatic. He continued in this state for five or six months, when he was suddenly seized with the most excruciating pain, confined at first to the region of the heart, but soon extending over the left side of the thorax. His dyspnoea increased, and he had violent palpitations and vomiting. The pain abated after an hour, and the next day he was as usual. During the following year the dyspnoea increased, and the pain returned seven or eight times. He afterwards became much emaciated, had a peculiar sallow tinge, and evening exacerbations of fever. The attacks of violent pain were now frequent, but of short continuance. He had also occasional attacks of palpitation, but there was no stethoscopic

evidence of disease either in the heart or lungs. After some time he became œdematous, and died suddenly. The wall of the right ventricle was occupied by a large knotted tumour, extending from the apex to the base, projecting very much externally, and protruding internally into the ventricle. The encephaloid substance composing it was firm in some points, and soft and diffuent in others. (*Anat. Path.* t. ii, p. 347.)

241. *G. True Scirrhus and Carcinoma* of the heart are, according to ORIO, still doubtful. Where the evidence of either has been most conclusive, there has also been scirrhus or carcinoma of other parts. Open carcinoma of the heart can hardly exist, as death will take place before the disease can proceed to this stage. Most writers, especially foreign pathologists, have confounded true carcinoma with fungoid or encephaloid disease; and cases have been recorded as examples of the former, when they were really instances of the latter. Of this kind are the cases adduced by LAENNEC, VELPEAU, ANDRAL, CRUVEILHIER, OLLIVIER, &c.—BAYLE and CAYOL never met with an instance of scirrhus of the heart. I have seen scirrhus in the lungs and pericardium in one case, and in the pleura and pericardium in another, scirrhus and carcinomatous disease having long previously existed in other parts of the body. M. BILLARD found, in an infant only three days old, three tumours embedded in the heart, possessing the characters of scirrhus. I doubt, however, their being actually scirrhus. M. RECAMIER observed the heart partially converted into a substance resembling the skin of bacon in a person who also had cancerous tumours in the lungs. Cases of a more doubtful description are recorded by CARCASSONE and DUCHATEAU. RULLIER states that he found cancer in the heart of a person who had this malady in other organs; and a somewhat similar instance is recorded in the *Revue Médicale* (t. i. 1824, p. 272.).

242. *H. Melanosis* has also been found in the heart and pericardium; but, in all the instances of this kind on record, this production has existed also in other parts.—As to the *Treatment* of analogous productions in the heart, it is unnecessary to offer any remarks.

OF POLYPOUS CONCRETIONS IN THE OF THE HEART.—BARTOLETTI and

were the first to impose the name of *polypi* on those concretions of lymph and fibrine which are sometimes found in the cavities of the heart and large vessels after death. KENKING first contended that these concretions were different, in their nature and mode of formation, from polypi of the uterus and nasal fossæ, to which BARTOLETTI and PISINI had likened them. But with KENKING originated the distinction of them into *false* and *true polypi*,—the former consisting of a *post mortem* coagulation of the fibrinous part of the blood, the latter presenting a consistent cellular or organised appearance, and being formed during the life of the patient. This distinction was first questioned by MORGAGNI, who denied the existence of true polypi of the heart, and in this opinion he was followed by LIEUTAUD, PASTA, and others. On the other hand, MANGET, MAFIGHII, PECHLIN, PRYER, F. HOFFMANN, and FANTONI maintained that the polypous concretions found in the cavities of the heart were to be regarded as the more immediate cause of death, and not as

having been formed at the time of death. The opinions of pathologists, however, remained long divided on this point, until CORVISART, TESTA, BURNS, BERTIN, KREYBIG, LAENNEC, and others investigated it somewhat more closely, and ascertained that, although these concretions occasionally form about the time of death, or immediately afterwards, there are others of a different kind, which are produced during the life of the patient, and occasion very severe symptoms referrible to the heart, but not of a kind which generally admit of a precise diagnosis.

244. *A. Of the Formation and Kinds of Cardiac Polypi*.—Polypous concretions are most frequently observed in the right cavities of the heart, and oftener in the auricles than in the ventricles. This is explained by the circumstances which favour their production; especially the stasis of the blood in the auricles, the state of the blood when it reaches the right auricle, and the extension of inflammatory action from the venous trunks. These three principal causes are especially concerned in the production of *three kinds* of concretions.—In the heart as well as in the veins, and even in the arteries, the fibrinous parts of the blood may concreate—1st, from a condition purely mechanical;—2dly, from an altered state of the blood itself, especially from the passage of morbid matter into it;—and, 3dly, from inflammatory action.—Each of these, as being especially concerned in the production of three varieties of cardiac polypi, requires a detailed consideration.

245. *a. Simple fibrinous concretions—the false polypi* of former writers—are frequently found in the right cavities of the heart, and sometimes extend into the vena cava and pulmonary artery. They are occasionally entangled in the columella carnea; but they have no organised or intimate connection with any part of the internal surface of the heart with which they are in contact. They consist of an inorganised accretion of the fibrinous and albuminous parts of the blood; are of an uniform colour, easily torn, and generally met with in patients who have died of chronic diseases; characterised frequently by a deficiency of the red particles of the blood, or, in cases of marasmus, great debility, or cachexy, and which have been accompanied by obstacles to the circulation, as from disease of the valves and orifices of the heart. These concretions may commence during the last moments of existence, or immediately upon dissolution. In cases of mechanical obstacle to the circulation through either the heart or lungs, the fibrinous parts of the blood may concreate in the right side of the heart so as to prevent the continuance of its action. The same result may also follow the remora or stasis of blood in the right auricle and vena cava, consequent upon extreme depression of the powers of life, or upon prolonged syncope, &c.; the concretion thus formed preventing the restoration of the heart's contractions. Under such circumstances, this variety of concretion may be the proximate cause of death, although formed so shortly before, especially in diseases of the heart, and during extreme vital prostration.

246. *b. Fibrinous concretions from the passage of morbid secretions into the blood*.—During languid states of the circulation, or when the fibrinous parts of the blood are disposed to coagulate, the passage of pus, or of the more consistent morbid

secretions, into the veins, occasionally determines or gives occasion to this act; the morbid matter carried into the circulation being the nucleus around which the fibrine concretes, especially in the situations, as the right side of the heart, most favourable to this occurrence. When a partial coagulation of fibrine is thus occasioned during the venous circulation, the concretions, at first small, often become entangled in the fleshy columns of the right side of the heart, and undergo changes arising—1st, from the concentric deposition of additional layers of fibrine, as in the cavities of aneurisms;—2dly, from their age or duration;—and, 3dly, from the effects they produce on the parts with which they are in contact. —(a) Upon dividing these concretions, the appearance of concentric layers of fibrine becomes manifest; and in the centre, either pus, or tuberculous matter, or a substance resembling a minute coagulum, is observed. —(b) The colour and consistence of these concretions depend chiefly upon their age. In the more recent cases, they nearly resemble those already described, and are soft or easily torn. Those of longer duration are more evidently disposed into concentric layers, more firm and fibrous, and generally of a paler tint; but varying from a greyish colour, to a greyish red or flesh-colour. —(c) When they are of considerable size, or of long duration, they appear to have compressed the fleshy columns in which they are entangled, and ultimately they become adherent, in one or more points, to the internal surface of the heart, in more immediate contact with them. This adhesion is manifestly owing to the irritation they have occasioned in this surface, and at these points, and to the consequent exudation of lymph, by which they become agglutinated, and more or less closely adherent. —(d) In this variety of concretion, there are neither blood-vessels nor vascular connections with the surface to which they become adherent,—circumstances readily explained by the modes of their production, and of their consecutive agglutination. At the same time, such adhesions are merely contingencies, and very frequently do not occur, especially in the more recent concretions. The form and size of these concretions also vary remarkably.

247. *c. Polypous concretions consequent upon internal carditis.*—Whilst the two preceding varieties of concretion are generally observed in the right side of the heart, that about to be considered is most frequently met with in the left; inflammation attacking this side of the organ, oftener than the right (§ 65, 68.).—This variety varies much in size and in firmness. It may not much exceed the granulations or excrescences described above (§ 66.), or it may be so large as to nearly fill one of the cavities. In its more recent state, it is generally amorphous, resembling concrete lymph, or the buffy coat of the blood, glutinous, and slightly adherent to some part of the internal surface, or of the fleshy columns or tendons of the valves. But, when it has been of considerable duration, it is more firm, fibrous, or cellulo-fibrous, in its structure, and more firmly adherent to the internal membrane, with which it seems as if continuous. In some cases, blood-vessels may be traced through this variety of concretion, and their communication with those of the heart's internal surface may be demonstrated.

When this form of concretion is of considerable size, there is every reason to suppose that it is not altogether, or even chiefly, formed of the lymph exuded from the inflamed internal surface, as the quantity of lymph thus effused cannot be more than will give rise to the granulations, excrescences, or vegetations, already noticed (§ 66.) But the lymph thus exuded, during a languid circulation, or states of the blood favouring coagulation, attracts and disposes the fibrine to concrete around it; and polypi of great size, sometimes disposed in layers, as the second variety, may thus be formed.—The firmness and cohesion of these polypi vary considerably, but their cohesion has no reference to the intimate nature of their connection with the heart's surface; for, in some cases, where the polypus was very soft, vessels could easily be traced from the heart into it, and these so large as to admit of injection (RIGACCI, in *Bullet. des Scien. Méd.* Sept. 1828; BEAUMONT, *Traité des Mal. du Cœur*, &c. p. 448.); whilst in other instances the polypus has been firm, intimately adherent to, and apparently forming a continuous structure with, the surface of the heart, and yet the existence of blood-vessels was not apparent. That this variety of concretion originates in inflammatory irritation of some part of the internal surface of the heart, is proved by the history of the cases in which it has been met with, and by the appearances exhibited upon dissection.—From the foregoing division and description of these productions, the diversity of opinions which has long existed as to their formation will be readily accounted for.

248. *B. Of the Signs of Cardiac Polypi.*—About the end of the last century, polypi of the heart were considered a frequent occurrence, and many of the disorders of respiration and circulation were attributed to them. J. J. ROUSSEAU took a journey to Montpellier to be treated for this disease, and, according to M. BOUILLAUD, upon foot, which he could not of course have done if he had been the subject of it.—It is evident that the symptoms will vary according to the situation, size, and origin of these formations—to the degree to which they extend into or fill up the cavities of either side of the organ. MALPIGHI, SAUVAGES, and BURNIER have entered into the diagnosis of these concretions, and alliance can be placed upon what they respectively deduced respecting it. Even the more recent observations of LAENNEC, HARTY, and others have not much advanced our knowledge. M. BOUILLAUD remarks, that it is necessary for them to have attained so great a size as to notably impede the circulation, before they can be possibly recognised during life. They do not, however, equally impede the flow of blood through the cavities in all the situations in which they may be placed. The concretions which are attached to the valves, or to their tendons, the other circumstances being the same, cause the greatest interruption of the circulation. When they occupy the right cavities, as most frequently is the case, the blood is sent in diminished quantity to the lungs, and accumulates in the venous trunks, causing congestion of the liver, brain, abdominal viscera, &c.; effusions into shut cavities and cellular parts; and asphyxy from deficient aërication of the blood, if the supply of blood to the lungs be much lessened. When they form in the left side

of the heart, the phenomena are, in some respects, the same; but congestion of the lungs is a necessary consequence, with dyspnoea, effusions into the bronchi, or substance of the lungs, &c.

249. According to LAENNEC, the sudden sup-
pervention of an anomalous, confused, and obscure
pulsation, in a patient who previously had pre-
sented a regular action of the heart, should lead
to the suspicion of a polypous concretion; and if
this disturbance takes place on one side only, this
indication is almost certain. M. BOUILLAUD con-
siders that the concretions consequent upon inter-
nal or external carditis, are indicated by (tumul-
tuous pulsations of the heart, with a dulness or
obscurity of the attendant sounds, or with a simple,
or hissing bellows sound; by oppression, dyspnoea,
or orthopnoea, and extreme anxiety, followed by
venous congestions, and leipothymia; and by
coma, stertorous breathing, convulsive movements,
an indistinct and very small pulse, and coldness
of the extremities. When these phenomena are
manifested in the course of an acute disease of
the heart, particularly during internal carditis, in
which there had previously been but little irregu-
larity and oppression of the respiration and cir-
culation, the existence of a polypous concretion
is very probable, and especially if the sounds of
one or more of the cavities are much diminished
or obscure.—In chronic diseases of the heart,
attended by habitual dyspnoea, the occurrence of
an insupportable orthopnoea and anxiety, with
obscuration of the sounds, restlessness, coldness
and lividity of the face and extremities, and oc-
casionally vomiting, also indicate the formation of
concretions, especially if these symptoms have
supervened without an obvious cause; and in
this case it is very probable that the concretions
exist in the right cavities.

250. C. The Prognosis and Treatment of poly-
pous concretions require but few remarks: the
former is always extremely unfavourable. In-
deed, it is doubtful whether recovery ever takes
place from them,—at least, when the indications
of their existence are tolerably conclusive. M.
BOUILLAUD, however, takes a more favourable
view of the issue of such cases; and thinks that
some are recent, and those which are not of large
size may be dissolved. This writer and M. LA-
ENNEC suppose that attempts should be made to
prevent the formation of these concretions in
diseases of the heart—both in those which con-
sist chiefly of interrupted circulation, and in in-
flammatory action. With this view they recom-
mend small bloodlettings from time to time, and
dilutents. It is probable that the disposition of
the fibrinous portions of the blood to concrete
may be counteracted by the exhibition of mercuri-
als, by the liquor potassæ and the subcarbonates
of the alkalies, and particularly by the sub-borate
of soda. This last substance I have found the
most certain in preventing the coagulation of fi-
brine, and in dissolving lymph; and it may, there-
fore, be prescribed with advantage, not only in the
inflammatory diseases of the heart, but also where
here is reason to suspect the formation of poly-
pous concretions.

251. X. OF RUPTURES OF THE HEART.—
A. Seat and History of, &c.—Rupture of the heart
was first observed by HARVEY. LANCINI and
MORGAGNI showed that instances of sudden death

were frequently owing to this cause. As examin-
ations after death became more frequent, cases
of this occurrence were more commonly met with;
and at the present epoch of pathological research
they are by no means rare.—MORGAGNI (*Epist.*
xxvii. 10.) remarked that rupture of the left ven-
tricle is more common than that of the right;
and that this latter is more frequent than rupture
of the auricles: this is confirmed by the particu-
lars of the cases which have been since recorded.
M. OLLIVIER states, that, out of 49 instances,
the rupture was seated in the left ventricle, in 34;
in the right ventricle, in 8; in the left auricle,
in 2; and in the right auricle, in 3; and that, in 2
cases, both ventricles presented several ruptures.
The results are, however, different in respect of
ruptures occasioned by external violence. In 11
instances of this description, the right cavities
were torn in 8; and the left in 3. In these 11
cases, the auricles were torn in 6.

252. In the above 49 instances of sponta-
neous rupture, the apex was found to be its seat,
in 9; this lesion in the others being nearer the
base of the organ. The directions of the lacer-
ations were various: in some the laceration was
transverse or oblique,—in others it was longitu-
dinal or in the direction of the fibres, or of the axis,
of the organ. In certain cases, it was extensive
on the external surface, and very small internally.
In other instances the reverse was observed. The
laceration may occur obliquely through the pa-
rietes, and resemble a sinus, as remarked by MOR-
GAGNI. It may even be incomplete, some of the
stretched fibres still remaining and concreting the
opposite edges (ROSTAN). It may also resemble
the perforation made by a bullet. It may, more-
over, involve only one or two of the muscular
layers, without penetrating into the cavity; and
it may be limited to a few fasciculi of fibres, or to
the fleshy columns, or even to the valves.—
When there is no apparent alteration of the tissue
at the place of rupture, it is difficult to determine
whether or not it has taken place from within
outwards, or in the opposite direction.—The
most singular circumstance, in the history of this
lesion, is the occasional occurrence of two or more
lacerations, in different degrees, in the same heart.
M. OLLIVIER, upon examining into the particulars
of the most authentic cases, found eight in which
there were several ruptures, either in the same
ventricle or in both. M. ROSTAN detected two
lacerations in the left ventricle; MORGAGNI,
three in the same situation; PORTAL, the same
number in the same place; Dr. ASHBURNER, two
in the left ventricle, and one in the right; M.
BLAUD found two penetrating the ventricles,
two involving only the superficial layer of the
left, and one the external layer of the right ven-
tricle; and M. ANDRAL observed five in the
left ventricle, and a perforation of the stomach in
the same patient.—Frequently, when the substance
of the organ is torn, some of the fleshy columns
corresponding to the rupture are also torn. In
some instances the fleshy columns are alone torn,
the parietes of the ventricles remaining entire. In
this case the derangement of the circulation be-
comes extreme, especially if the tendinous cords
attached to the free margin of the valves are rup-
tured (OLLIVIER). Instances of this kind are
recorded by CORVISART, LAENNEC, BERTIN,
ADAMS, and others. Ruptures of the heart have

been arranged as follows by DEZIMERIS:—1st. Rupture from external violence;—2d. Spontaneous rupture without previous lesion of the issues of the organ;—3d. Ruptures consequent upon dilatation;—4th. Ruptures with *probable*, but not with demonstrable, lesion;—5th. Ruptures owing to softening of the heart;—6th. Ruptures from abscess;—and, 7th. Ruptures caused by ulceration, or perforation of the heart. M. OLLIVIER has adopted a somewhat similar plan to the foregoing in his treatise on this subject.

253. a. *Rupture of the Heart without previous lesion*, or without demonstrable lesion, is comparatively rare. In the cases recorded by PLOUCQUET and FISCHER, the rupture was preceded by severe pain, continued or remittent, in the left shoulder, and about the margin of the left shoulder-blade, and shooting down the arm, and left side of the thorax, and attended by a sense of laceration, pressure, and anxiety at the præcordia and epigastrium, sometimes with numbness and prickings in the shoulder and arm.—In other instances, as in those published by PORTAL, BARON, and ANDRAL, death has occurred without any previous ailment, excepting dyspnoea, which was observed only in the case recorded by PORTAL.

254. b. *Rupture consequent upon Narrowing of the Orifices*, with or without hypertrophy or dilatation of the cavities of the heart, is a more frequent occurrence than the foregoing. MORAGNI has adduced several instances, in which the laceration was consecutive of alterations at the origin of the aorta. HALLER has cited a similar case; and others have been recorded by PORTAL, ROSTAN, and DEZIMERIS. In a case published by CHACSIER, in which death occurred during a dispute, the aorta was found constricted at its origin by a cartilaginous tumour which surrounded it. There can be no doubt that an obstacle to the circulation at the heart's orifices will favour rupture of the cavity behind it; and that laceration may occur, although the parietes of the cavity are hypertrophied. Instances of this latter occurrence have been published by MORAGNI, ROSTAN, and others. MORAGNI supposed that, when the rupture is connected with hypertrophy, it takes place in that portion of the parietes which is the least thickened and resistant. But this is not always the case; for the rupture has been observed in the most hypertrophied part. M. CROMEL supposes that, when this has occurred, the ventricle has been almost equally thickened and resistant throughout, and that the part torn, although the most hypertrophied, has been actually the weakest. If the sole cause of rupture were a distending force, or even the resistance furnished by the contents of the cavity to the contraction of its parietes, in forcing the contents onwards, then might the laceration take place in the weakest part; but the rupture does not always occur in this way; for it is reasonable to infer that the same circumstances as occasion increased action and consequent hypertrophy, will sometimes produce laceration, when their increase is rapid, or the obstacle to the circulation through the cavity of the heart insurmountable; and that hence the muscular structure is torn by its own excessive action at the very part where the contraction is most energetic.

255. c. *Dilatation of the cavities* might at first appear more frequently connected with rupture,

than hypertrophy has been found to be, laceration of the parietes following the extreme or sudden dilatation of them; but this connection has been even less frequently observed than the preceding. Instances of it have, however, been adduced by MORAGNI, MARTINI, and SCHIFFER. Local or partial dilatation might also appear frequently to terminate in rupture of the dilated part: but this is also a rare termination, as the adhesion of the part to the pericardium, or the formation of fibrinous layers in the interior of the sac, prevents it from being so easily torn as it otherwise would be. M. OLLIVIER remarks, that of nineteen instances of local dilatation, rupture occurred only in the three cases recorded by GALEATI, PENADA, and BIGNARDI.

256. d. *That Rupture should be favoured, or occasioned, by partial or general Softening of the Substance of the Heart*, will be readily conceded; and several cases are recorded in illustration of the occurrence.—In all these the softening was great, although varied in its characters: in some it has been denominated *gangrenous*, particularly by the older writers; in others *apoplectic*, by CRUVEILHIER (*Anat. Path. fasc. iv.*); and in others *gelatiniform*, or *senile*, by BLAUD. Of the second of these varieties, instances have been adduced by TENG-MALM, CORVISART, and ROCHOUX. M. OLLIVIER states, that the thesis of this last writer contains several cases of this kind of rupture.—Instances of the third variety of softening terminating in laceration are published, in the places referred to below, by HAZON, and others. In a case by S. FRANK, this alteration appears to have arisen from lesion of the *nervi vagi*; and in one by HODGSON, the softening and atrophy seem to have followed obliteration of the coronary arteries.—Rupture has also been occasioned by the softening attendant upon fatty degeneration of the heart (§ 224.). MORAGNI, SCHMUCKER, and ADAMS, have recorded cases in which this form of softening had terminated in laceration.

257. e. *Abscess in, or Ulceration of, the Muscular Structure of the Heart* has also been found to have terminated in Rupture.—In cases recorded by MORAGNI, PORTAL, BRENA, LANGLADE, &c. II. CLOQUET, ulceration had partially penetrated the parietes of one of the cavities, the right layer being torn by the distension, or resistance, and the contents of the cavity. Instances of rupture of the structure of the organ recorded by ERDMANN and MOTT, and quoted by DEZIMERIS, terminated in a similar manner to the foregoing,—the termination admitting of the same explanation.

258. f. *The Rupture may be partial, or confined to one or more Layers, or muscular Fasciculi, or tendinous Cords of one or more Cavities*, as stated above, and as shown by CORVISART, and confirmed by LAENNEC, BERTIN, ADAMS, and others.—In the three cases recorded by CORVISART, the rupture appeared to have been occasioned by violent physical efforts. BERTIN detected rupture of one of the fleshy columns of the right ventricle, and attributed it to violent fits of cough. LAENNEC found one of the tendinous cords attached to the free margin of the mitral valve torn across; and Dr. CHEYNE met with another instance of rupture of one of these cords in a person affected with dilatation and hypertrophy of the left ventricle.—Cases in which rupture of the *fleshy columns* and *tendinous cords* have occurred, have

likewise been observed by BOUILLAUD, TOWNSEND, and others.

259. *g. Ruptures of the Valves* are not infrequently met with, as a consequence of fragility arising from induration and ossification, or from softening caused by inflammatory action; but previous disease is not always necessary to the production of this rupture, especially when it is produced by external violence, or by sudden and violent physical efforts. When, however, it is consequent upon slighter grades of these causes, or upon mental emotions, previous disease of the valves, or of the orifices, or of the internal surface, of the heart may be inferred; otherwise they would have been inadequate to its production. If the rupture of the valve be partial, the patient may live a considerable time afterwards; but extensive chronic disease will be the result, owing to the local irritation, and to the imperfect function of the valve, particularly further structural change of the ruptured valve, dilatation, or dilatation with hypertrophy, of the chambers of the heart, &c. When the rupture is extensive, and has been favoured by existing structural change, death either follows almost instantly, or takes place in a short time. When the rupture is partial, the patient may live for a considerable time, with the symptoms of insufficiency of the valves (§ 76, 198.).

260. *F. Rupture of the Heart from external Violence* is not a rare occurrence. Contrary to what is observed in respect of spontaneous rupture, the laceration occasioned by external force is more frequently seated in the right, than in the left, side of the organ; and much more commonly in the auricles, than in the ventricles. As M. DZEMENIS has argued, it is very probable that the mode in which the rupture is produced by external injury, depends much upon the nature and seat of the injury. When the region of the heart, or the thorax, is the seat of the external violence, the rupture takes place in the cavities possessed of the weakest parietes, and in the most yielding points of these: but when the injury is of a kind to prevent the heart from evacuating its contents, as in the case of a carriage-wheel passing over the heart, or of any heavy body pressing upon the heart, the muscular efforts of the ventricles to evacuate their contents, may occasion either a partial, or a complete rupture of them, or of the vessel at some point between the heart and the part pressed upon.

261. *B. The Causes of Rupture of the Heart*, especially the most material, and those connected with the pathological states of the organ, have been already stated, and explained under distinct categories. There are, however, various other causes which determine, aid, or accelerate these in their operation. Violent mental emotions, particularly anger, fright, terror, unexpected disappointments, distressing intelligence suddenly communicated, anxiety, &c.; sudden and violent muscular efforts, and laborious or prolonged physical exertions of any kind; particularly in constrained positions. The act of coition and straining at stool have often occasioned rupture; a very large proportion of the cases of it on record having been attributed to these causes. M. OLLIVIER states that rupture of the heart occurs more frequently in men than in women; but this is not satisfactorily determined. It is certainly more common

in persons far advanced in life, than in the young. M. BRAUD considers the rupture that takes place in old age, as generally the consequence of softening of the heart. Several cases recorded by him, and by other writers, confirm this; and those adduced by CRUVEILLIER and SMITH further show, that softening terminating in rupture of the left ventricle is often accompanied, in old persons, with great accumulation of fat on the surface of the organ.

262. *C. Symptoms and Diagnosis.*—*a.* The cases hitherto recorded throw but little light on the diagnosis of this lesion. Some of these have furnished proofs of disease of the heart for a longer or shorter time: whilst others, up to the hour of death, had complained of no symptom indicative of any affection of the heart or large vessels. In the instances recorded by PROUQUET, OLMI, CHARPENTIER, and FISCHER, the patients complained, for a short time before death, of a violent pain in the left shoulder, extending to the arm, and occasionally to the whole side; attended, especially at last, with more or less numbness, and characterised by exacerbations and slight remissions. In some cases, inexpressible anxiety and pain have been felt in the præcordia and epigastrium, with cold extremities and cramps, shortly before dissolution. In the majority, rupture has produced instant death; but in some this has not been the case. In the instance adduced by J. FRANK, life was prolonged twelve hours, probably from a coagulum filling up the laceration for a time. In a case recorded by RUSK, the rupture was produced by the passage of a carriage-wheel over the chest, and was seated in the right auricle; yet the patient survived fourteen hours.

263. In most of the cases in which the rupture is preceded by violent pain, M. OLLIVIER thinks that it is produced gradually, from the successive laceration of several layers or fasciculi of muscular fibres; and that the pericardium becomes only gradually distended by the effused blood. Where the laceration and aperture are at once large, a copious effusion instantly occurs, fills the pericardium, and abolishes the contractions of the organ.

264. *b.* When the rupture is seated in the *partitions between the auricles or ventricles*, a fatal result may not very rapidly occur. In this case, the venous may be mixed with the arterial blood; although this may take place only to a small extent.—*c.* In the three cases of *rupture of the fleshy columns* detailed by CORVISART, a sudden oppression and sense of impending suffocation was the first symptom complained of. The pulse became unequal, irregular, and intermittent; and the pulsations of the heart confused. This state of distress and anxiety may continue for some days, before it terminates in death; or it may endure much longer, and be accompanied with various signs of organic disease of the heart.—*d.* *Rupture of the valves* will necessarily be attended by much irregularity or disorder of the circulation, and by a simple, or hissing, or musical bellows sound. (BOUILLAUD, FARRALL.)

265. *As the diagnosis of rupture of the fleshy columns and valves of the heart, in the present state of our knowledge, is very imperfect; and as the signs of rupture of the parietes of one of the cavities are equivocal; nothing can be adduced as*

to the *Treatment* of these lesions. Indeed, in most instances, medical interference will be quite unavailing; and even as much mischief as benefit may result from it.*

266. xi. ALTERATIONS OF THE BLOODVESSELS OF THE HEART.—The coronary vessels are more or less enlarged in hypertrophy of the heart, and diminished in atrophy. Some writers have supposed that the smallness of the vessels in the latter lesion is actually the cause of it; but the state of the vessels is solely dependent upon the nutrition of the organ. PORTAL (*Anat. Méd.* t. iii. p. 74.) found the coronary veins dilated and varicose; and the larger trunks have contained polypous concretions (KREYEN). The coronary trunks, both veins and arteries are always very much, and progressively, enlarged with the accession of age, as shown by M. BIZOT. The most common alterations, however, of the cardiac vessels are cartilaginous and ossific formations in the *arteries*. These, especially the ossific deposition, may consist merely of small isolated patches, or they may nearly or altogether surround the vessel. Ossification may extend along the greater part of an artery, or to two or more. Generally, the canal of the vessels is uninterrupted, although the parietes have become quite inert. Cases, however, have occurred in which the canal has been obliterated. Instances of extensive ossification of the cardiac arteries have been recorded by PARRY, RING, PORTAL, HODGSON, and others; and have been usually found associated with softening, flaccidity, or some other change in the nutrition of the organ. Angina pectoris has been supposed to depend upon this change, but numerous instances of ossification of the coronary arteries have been met with without this complaint, or, indeed, any symptom referable to the heart, having existed.

267. xii. COMMUNICATION BETWEEN THE SIDES OF THE HEART.—This lesion is most frequently congenital, or the result of malformation, or imperfect development of the organ. It occasionally increases suddenly about the period of puberty. M. BENJIN (p. 436.), and M. BOUILLAUD (t. ii. p. 564.), however, believe that it is not unfrequently a consequence of ulcerative perforation; whilst M. LOUIS maintains that it very rarely arises from this latter cause. The communication may exist through the interauricular, or through the interventricular partition, or through both at the same time. BOUILLAUD remarks that, in many cases, the opening in the interauricular partition is a persistent state of the *foramen ovale*; but, in others, that it is consequent upon ulceration, parti-

cularly when it occupies a situation different from that in which the oval foramen is always found, and when there are more than one perforation. The communication in this situation is generally by a rounded opening, with smooth, sometimes thick and tendinous, margins, commonly of from four to six lines in diameter, but sometimes of nearly double this size. The perforation of the *interventricular partition* is found in various situations, but most frequently at the junction with the partition of the auricles, and towards the insertions of the pulmonary artery and of the aorta. The form of the openings is commonly round, and the diameter is the same as those of the interauricular partition, the margins presenting the same polished and fibrous appearance.

268. The state of the valves and orifices of the heart, in cases of communication between the opposite cavities, is important. Of fifteen cases, detailed by BOUILLAUD, the valves were indurated, thickened, corroded, or perforated in twelve; and, in ten of these twelve, the orifices to which these valves belonged were more or less contracted. In eight of the twelve cases, those lesions affected the right; in three, the left valves and orifices. In five of the eight cases, they were seated in the pulmonary valves; in two, in the tricuspid valve; and, in one, in both the pulmonary and tricuspid. Of fifty-three cases of cyanosis noticed by M. GINNIAC, similar lesions to the above were found in twenty-seven; and in all these latter, they were seated in the right side of the organ; twenty-six being at the orifice of the pulmonary artery, and one only in the auriculo-ventricular orifice. The contractions of the orifices and lesions of the valves, in these cases, did not differ from those described above (§ 67, 213.). The greater frequency of the narrowing of the right orifices, particularly that of the pulmonary artery, in cases of communication between the opposite cavities, is deserving notice. This lesion M. LOUIS considers to be congenital. M. BOUILLAUD believes it to be, in some cases, caused by inflammatory action.

269. In eleven of the fifteen cases given by M. BOUILLAUD, the heart was enlarged, dilatation, with hypertrophy, having existed in the right side. Dilatation of the right auricle was observed in four cases; and, in most of these, the parietes of the auricle were also thickened. Hypertrophy of the right ventricle was met with in ten cases; and, in four of these, the hypertrophy was concentric. The left side of the heart presented nothing abnormal, excepting the induration of the valves, and narrowing of the orifices, in the three already noticed (§§ 268.). In the twenty cases reported by M. LOUIS, nearly the same appearances as in those of M. BOUILLAUD were observed. Dilatation of the right auricle existed in nineteen, six times with hypertrophy, and twice with thinning of its parietes. Dilatation of the right ventricle was observed in ten, hypertrophy in eleven, and both dilatation and hypertrophy in five instances; whilst, on the left side, dilatation of the auricle occurred three, that of the ventricle four times; and hypertrophy of the former twice, and that of the latter three only. (See BLUE DISEASE, § 8.)

270. In some instances, communication between the opposite sides of the heart is associated with other lesions of malformation; as the connection of the aorta with the right ventricle (RIBES), or with both ventricles (LOUIS), the persistence of the ar-

* The only instance on record, showing the possibility of recovery, more or less partial, from rupture of the heart, has been published by ROSTAN; but some mistake may have existed as to the morbid appearances. The case is, however, very interesting. — A woman had experienced, fifteen years previously to death, a violent pain in the præcordia and epigastrium, extending to the back, and returning at intervals. She was afterwards subject to palpitations, followed by syncope. Her death was sudden. The pericardium contained blood effused in its posterior part, but was adherent to the heart anteriorly by several albuminous layers. On removing it, an irregular rupture, an inch and a half in length, and quite recent, was found; but, to the left of this, and at a distance of six lines, the substance of the organ was destroyed, and replaced by a fibrous concretion, entirely similar to those found in aneurismal sacs, and intimately connected with the structure of the heart. The ventricle was thinned in this situation. The latter appearance was attributed to a rupture which had taken place at a long bygone period.

terial canal, &c. (See BLUE DISEASE, § 8.) The state of the *pericardium* has been noticed in a few only of the cases of this description; and in these alterations depending upon chronic pericarditis, and effusion of a serous fluid, were chiefly observed.

271. The symptoms of the lesion under consideration are generally equivocal; for, as it is generally associated with disease of the valves and orifices, and with dilatation and hypertrophy of the corresponding chambers of the organ, it becomes difficult to separate the phenomena actually depending upon these lesions from those arising from the communication between the opposite cavities. The palpitations, dulness on percussion of the præcordial region, the purring tremor, the bellows or saw-sound, the faintings, sinkings, oppression, &c., the irregularity and smallness of the pulse, the venous and serous congestions, &c., observed in these cases, are manifestly owing to these associated lesions. That more or less admixture of the venous and arterial blood results, in consequence of the communication, must be admitted. M. Louis thinks that it takes place chiefly on the entrance of the blood into the communicating cavities, and on the departure of the blood from these cavities, when the natural orifice is more or less constricted.

272. Blue discolouration of the skin (See BLUE DISEASE) has been attributed to this communication; but it is not always observed, and it is rarely universal. Sometimes it is not remarked, even in the countenance, till the last period of the patient's life. This change of colour is to be attributed as much to the obstacle to the circulation of the venous blood, as to the communication between the opposite sides of the organ; and this communication has generally existed a considerable time before the health has been very remarkably affected. The symptoms assigned to this alteration, particularly blue discolouration, leipothymia, great sensibility to cold, oppression and suffocation in the thorax, are chiefly an aggravation of those observed in other diseases of the heart, and are often wanting in this. According to M. Louis, the symptoms most to be depended upon is, a sense of suffocation, occurring sometimes periodically, but always frequently, accompanied or followed by leipothymia, and with or without blueness of the skin, and occasioned by the slightest causes.

Mixture of the red and dark blood, even to a considerable extent, at least in appearance, seems not incompatible with a tolerably prolonged existence, nor with development of the intellectual faculties. It has no manifest effect upon intercurrent diseases. The existence of a communication between both sides of the heart, even when it becomes somewhat manifest, is not so dangerous as the blue disease. The former may not give rise to serious phenomena; the latter indicates that the communication is accompanied with a dangerous interruption of the circulation through the right side of the heart, or some equally dangerous lesion. As to the treatment of this alteration, I cannot add any thing to what I have stated in the article BLUE DISEASE (§ 12.).

273. VI. DISPLACEMENT AND PRETERNATURAL POSITIONS OF THE HEART. — The situation of the heart is sometimes abnormal, owing to malformation; but my limits will not admit of an account of the various alterations of the position, and of the form, of the organ, observed as a congenital vice. Those who are desirous of obtaining information

on this subject will find it in the works of HALLER, MECKEL, OTTO, BRESCHE, BOUILLAUD, and others, referred to at the end of this article. The position of the heart may be abnormal in several ways, from malformation; it may be placed externally to the thoracic parietes, or internally in the abdominal cavity, below the diaphragm, or in the right side of the thorax; and the vice in situation may be associated with other anomalies, either in the circulating system, or in the position and form of the adjoining viscera, or in both. These, however, are matters calculated rather to excite curious speculation than to lead to practical inferences. But with true displacements of the heart, or alterations of position after birth, the case is different. These displacements arise from disease, or injury of the organ itself, or of adjoining parts; and the extent of the alteration, and the manner or mode of its occurrence, in such cases, are matters of real practical importance.

274. a. The apex of the heart may be turned altogether to the left side, without further alteration of position, or it may be raised at the same time somewhat higher in the thorax, by excessive hypertrophy of the organ. — b. The heart may be pushed downwards, by an aneurism of the arch of the aorta, or by some other tumour pressing upon it. Cases of this kind have been recorded by LANCISI, MORGAGNI, and OTTO. — c. True prolapse, or dragging down of the organ, from increased weight, and weakness of the parts supporting it, is very rare; but it has been noticed by LEIDENFROST, SENAC, ZULLANI, PACHIONI, OTTO, and TESTA. In this form of displacement, the diaphragm is carried before the heart, a convex tumour thereby invading the abdomen. — d. The heart may be pressed unusually high in the thorax, or towards the neck, by enlargement of the abdominal viscera, by large hydatid cysts, by inordinate distension of the stomach or colon, by excessive dropsical effusion into the peritoneum, by tumours of the spleen, liver, or other parts, and by aneurism of the descending aorta. Instances of these occurrences have been adduced by the writers referred to hereafter. One of the most common causes of this displacement is aneurism of the descending thoracic, or of the abdominal, aorta. In such cases, a double pulsation is felt in the aneurismal tumour, as in those recorded by Drs. GRAVES and STOKES.

275. e. The heart is not unfrequently pushed over to the right side by various alterations in adjoining viscera. It must, however, be recollected that this organ may be situated towards the right side, owing to original conformation, or to transposition of some or of the whole of the viscera. Instances of this are, however, very rare; but several have been adduced by the writers mentioned above (§ 273, 274.). The alterations causing the displacement of the heart to the right side, are, destruction or condensation of the right, and hypertrophy of the left lung, as in the case recorded by Dr. ABERCROMBIE; dropsical effusion into, or encysted dropsy of, the left thorax; pneuma-thorax of the left side; collections of pus or of blood in the left pleural cavity; tumours of various kinds; diaphragmatic herniæ; and curvatures of the spine. Dr. STOKES mentions a case in which the heart was thrust by a blow of a wheel to the right side, where it continued long afterwards to pulsate.

276. Several instances of displacement of the heart to the right thorax have been observed by me. In all

these, it arose from the effusion of fluids, of various kinds, in the left pleural cavity; in one case, from the effusion of blood from external injury, with fracture of the ribs; in three, from pleuritis of the left side, terminating in serous effusion; in two, from empyema; and in two, from pneumo-thorax. In one of these latter, consequent upon tubercles, the patient had not been long ailing. The passage of air into the left pleural cavity was sudden and rapid. I saw him within two hours from the commencement of the distress consequent upon it, and immediately detected the pulsation of the heart on the right side.

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HEPATITIS.—See LIVER, INFLAMMATION OF.

HERPETIC ERUPTIONS.—SYN. *Herpes* Έρπης (from Έρπαιω to creep), Galen, Dioscorides; *Furmea*, Avicenna. *Cytisma Herpes*, Young; *Herpes*, Sauvages, Linnæus, Willan; *Serpigo*, Auct. var. *Lephyllis Herpes*, Good; *Dortre*, *Herpe*, Fr.; *Die Flechte*, Zuttermal, Germ.; *Erpete*, Ital.; *Vesicular Tetter*, the *Serpigo*, Fret.

CLASSIF. — 4. Class. 8. Order (Cullen). 6. Class. 3. Order (Good). 6. Order. 3. Genus (Bateman). III. CLASS. I. ORDER (Author, in Preface).

1. DEFIN. — An eruption of vesicles, in distinct irregular clusters, upon inflamed bases which extend somewhat beyond the margin of each cluster; attended by tingling, concreting into lamellar scabs, and not contagious.

2. A genus of eruptions, characterised as just stated, has been very accurately described by WILLAN, BATEMAN, BILTT, and RAYER, under the name of *herpes*. This designation represents, according to the above definition, affections in many respects different from those comprised under it by LORRY, TURNER, ALIBERT, and others; and is employed by the former writers in a more rigorous sense. Yet the several species enumerated by BATEMAN and RAYER are manifestly too numerous, some of them being merely varieties arising out of the forms which the clusters of vesicles assume, and of the situations in which they are often observed. In this opinion, I am supported by M. BERT and Dr. A. T. THOMSON, who have arranged them accordingly.

3. *Herpes* is an inflammatory affection, chiefly of the vascular rete of the skin, causing the effusion of a thin fluid, which elevates the cuticle into groups of small vesicles. This affection occurs generally in circumscribed patches, the skin retaining its natural aspect in the intervals; passes through a regular course of increase, maturation, and decline; and terminates usually in from ten

to fifteen days, but is sometimes prolonged to twenty-one days. It is frequently preceded by constitutional disorder, and is sometimes critical of other diseases. The vesicles are filled at first with a colourless and clear fluid, which gradually becomes milky and opaque, and ultimately concretes into thin scabs; but occasionally a discharge of it takes place, and ulcerations follow. Tingling or pricking pains sometimes attends the eruption. In some cases, as the crusts fall off in one part, fresh vesicles arise in the vicinity, and the eruption thus creeps over a large portion of the surface and its duration is thereby prolonged. — Adopting the division of M. Biett and Dr. A. T. Thomson, I shall consider the forms of Herpes as follows:—*Species 1. Herpes Phlyctenodes*; — var. *a. H. Zoster*; *b. H. Circinatus*; *c. H. Labialis*; *d. H. Præputialis*. — *Species 2. Herpes Iris*.

4. I. DESCRIPTION. — Spec. i. HERPES PHLYCTENOIDES. — CHARACTER. — An eruption of small transparent round vesicles, in irregular agglomerated patches, preceded and attended by slight constitutional disorder.

5. This species occasionally appears on the forehead, cheeks, and neck, but more commonly in the extremities; and is often disseminated over different parts of the body. A sensation of itches, tingling, or painful smarting, or pungent heat of the part about to be affected, is followed by very minute and almost imperceptible red points, clustered so as to compose an irregular-coloured patch, varying from the size of half a crown to that of the palm. After some hours, or next day, a number of hard, shining, round vesicles, the size of millet-seeds, or a little larger, arise on the inflamed patches, and are filled with a colourless, or pale citron-coloured serum, or with a brownish serum in the aged or cachectic. The vesicles are grouped in irregular clusters, of different sizes, varying from a dozen to fifty vesicles, or more. To the primary cluster or clusters, others succeed; the integuments intervening between the clusters preserving their healthy hue. The tingling and smarting are increased by heat, and by the warmth of bed. The size of the vesicles generally increases, and some acquire that of a pea, or become larger, apparently by the confluence of several into one. In about twenty-four or thirty-six hours, the fluid in the vesicles becomes milky, in the smaller, and brownish, or sanguinolent, in the larger. The whole decline or break from the sixth to the tenth day; but new clusters often continue to arise. The fluid and detached cuticle are rapidly turned into yellowish or blackish scabs, which are loosened or fall off from the tenth to the fifteenth day, or even later. The surface affected retains for some time a red or livid colour, and continues the seat of prickings or smarting. The fluid of the very minute vesicles is occasionally absorbed, and thus some of the clusters miscarry. In rare cases, the clusters have a circular form, and the areas of the groups are covered by distinct vesicles—the *Nirles*. This form is attended by severe pain, and much constitutional derangement.

6. This species of herpes is generally preceded by disorder of the digestive organs, flatulent distension or oppression at stomach; by thirst, heat, and slight febrile disturbance; and by an unhealthy state of the excretions. The constitutional

disturbance is not relieved by the eruption, but often aggravated by the heat and tugging of the successive groups of vesicles. This eruption usually assumes an *acnte* form, and *terminates* within three weeks, but it sometimes becomes *chronic*, one crop of vesicles succeeding another. It may appear in persons labouring under other diseases, especially of the biliary organs, and of the digestive mucous surface.

7. A. Herpes Zoster. — SYN. Ζώνη; Zona, Scribonius Largus, Sagar; Herpes Zoster, Hoffmann, Willan; Erysipelas Zoster, Sauvages; Shingles. — This variety differs from phlyctenoid herpes in the size of the vesicles, in the seat of the eruption, and in the mode in which the clusters successively appear and extend themselves. The vesicles are closely agglomerated, but distinct; they increase to the size of pearls in twenty-four hours; and are filled with a limpid transparent fluid. The inflamed bases are irregular and large, extending some distance beyond the vesicles. The most frequent seat of this variety is the trunk, particularly the abdomen and lower part of the thorax. As the patches successively appear, they extend either obliquely round the waist, or across the shoulders; or from the shoulder to the arm; or from the nates obliquely down the thighs. They very rarely advance perpendicularly. The right side is more frequently affected than the left; the eruption rarely or ever appearing on both sides at once. Of fifty-three cases, RAYER observed thirty-seven on the right side.

8. Shingles are preceded by febrile rigors, quickened pulse, headach, thirst, and disorder of the digestive organs, and of the excretions. Pains darting across the chest, scalding heat, smarting or stinging pain in the part about to be the seat of eruption, are also often present; but frequently the antecedent and attendant constitutional disturbance is but slight. The eruption consists at first of patches of shining or silvery vesicles. These usually extend, in the form of a zone; but sometimes they appear at the opposite extremities of the zone, and join by successive patches extending towards the centre. The vesicles of the individual groups reach their utmost size, which seldom exceeds that of a pea, in three or four days. The patches are then more florid, and the redness extends a few lines beyond their circumference. At the end of five or six days, the fluid of the vesicles presents an opalescent hue, becomes seropurulent, or even purulent, if the inflammation run high. The redness of the base is now deeper, or more livid, and some of the vesicles subside; others break even before this, and, the cuticle being detached, suppurate for a few days; but the greater number dry up, and form yellowish, or brownish lamellæ, or prominent scabs, which in ten or twelve days fall off, leaving the skin red and tender. In old debilitated, or cachectic persons, the vesicles often enlarge into *bullæ*, soon break, suppurate, or even ulcerate. The greater number of the vesicular groups of zona arise in succession; and, while those which have first appeared are becoming purulent, or drying up, others arise in the intervals, and pursue the same course. In from ten to twenty-one days, the whole of the incrustations are detached; but, when the vesicles are very large, or confluent, and the skin much inflamed, ulceration sometimes takes place,

and the disease is much longer protracted. In some cases, the pain described above continues for a time after the eruption has healed. The febrile symptoms often subside when the eruption is completed, but these symptoms are sometimes aggravated during its progress; the deep-seated pain in the part occasionally continuing to the last.

9. *B. Herpes Circinnatus*,—*Ringworm*, *Vesicular Ringworm*—is characterised by small, round, and crowded vesicles arranged in the form of rings. It appears on the neck, cheeks, forehead, arms, shoulders, and other places, in red, oval, or circular spots, of half an inch to two inches in diameter; and is attended by itchiness and smarting. The redness is much less in the centre than towards the circumference of the smaller spots, and is entirely wanting in the areas of the larger patches. Small vesicles, whose bases are slightly inflamed, containing a transparent fluid, rapidly appear in the circumference of the patches, the areas becoming temporarily of a slight red colour. From the fourth to the sixth day of the eruption the redness declines; the vesicles become turbid, and either burst or are covered with thin brownish incrustations, which are detached between the tenth and fifteenth day, a slight desquamation at the same time taking place from the centres of the patches, when the redness had extended to them. Patches of small size often have the fluid in their vesicles absorbed, the cuticle exfoliating. The duration of this eruption does not extend above the time just specified; but it may be protracted very much longer, when the eruption of the vesicular rings is successive. In some instances the areas of the patches are covered with minute vesicles; and when this is the case, the patches spread, and extend over a considerable space. M. RAYER and Dr. A. T. THOMSON state that this eruption is seldom accompanied by any constitutional disturbance. This, however, does not agree with my experience. The general disorder is certainly very slight, and thus escapes detection; but, in most cases, the digestive canal is more or less deranged, and the evacuations morbid.

10. *C. Herpes Labialis*—*herpes of the lips*—is similar to the varieties already described, as respects the characters and progress of the vesicles, the only differences resulting from situation. It may be seated, either in the lower, or in the upper lip, or it may extend around the mouth. It is sometimes confined to the angles. It usually appears outside of the true lips, extending to the line of union between these and the skin. Sometimes patches of the eruption also appear on the cheeks and also of the nose.—In three or four days, the vesicles contain a yellowish purulent fluid. The lips swell, and as the disease proceeds, become hard, sore, stiff, hot, and smarting. After the vesicles break, and crusts form, and especially if the latter are prematurely removed, the redness increases, the surface becoming harsh or cracking; and the disease is often protracted.—When it is consequent on disorder of the digestive organs, it often assumes a chronic form.—This variety is generally consequent upon a febrile state of the system and disorder of the *prima via*. The patient complains of headach, chills, pains in the limbs, lassitude and want of appetite for some time before the eruption appears. The alvine evacuations are usually morbid, and the abdomen

often tumid or tender. Sometimes this variety is critical of catarrhal complaints, of agues, and of several acute diseases attended with pyrexia. It is occasionally preceded, or accompanied by vesicles or aphthæ in the mouth.

11. *D. Herpes Præputialis* (*Aphthæ præputii vel vulvæ*—*Ulcuscula præputii*)—is characterised by one or more groups of small, round vesicles, on the outer or inner surface of the præpuce, or on both, that usually disappear in about a fortnight. It begins in one or several patches of from four to eight lines in diameter, which are circumscribed, and of a vivid red; and rarely appears on the glans penis. The eruption of vesicles is preceded by itching and tingling of the part, which is slightly inflamed and tumid. Small vesicles arise between the second and fourth day, containing a transparent serum, which, about the fourth day becomes turbid, and afterwards puriform. On the exterior, they dry and form scabs, from the fifth to the seventh day, of a lamellar or conoid form; and, if the part be not exposed to irritation or friction the healing process proceeds underneath the scabs which are thrown off from the seventh to the tenth day. When the eruption occurs on the inner surface of the præpuce, the vesicles generally break as early as the fourth day, and the inflamed rete becomes exposed, forming a superficial sore, which has been mistaken for chancre.

12. This variety of herpes not infrequently occurs on the *labia vulvæ* of women affected with leucorrhœa, or during pregnancy and after delivery; and the eruption may be either internal, or within the labia. In these cases, the characters and progress of the vesicles, and of the consecutive sores, are the same as already described.

13. ii. *HERPES INIS*.—*CHARACT.* *Small groups of vesicles surrounded by four concentric erythematous rings of different hues.*

14. This species was first arranged under herpes by Dr. WILLAN. It was accurately described by Dr. BATEMAN. It occurs most frequently on the back of the hands, olecranon, knees, ankles, instep, and similar parts. It commences in small red spots, consisting of concentric rings of varying shades. These spots enlarge from two to about eight lines in diameter; and, in their centres, a yellowish-white, flattened vesicle appears from the second to the third day, surrounded by several others of a smaller size, arranged in a ring. This central vesicle is surrounded by a circle of a dull brown colour, this by a second nearly of the colour of the vesicle; this second by a third circle of a deeper red; and the third, by a fourth, formed on the seventh, eighth, or ninth day. This, the most external ring, is of a rosy tint, which passes insensibly into the colour of the healthy skin. The third is the narrowest of these rings; and they may all become covered with vesicles, but the first is most frequently so covered. From the tenth to the twelfth day the fluid of the vesicles is absorbed, or it escapes and dries into scabs, which are detached two or three days afterwards.

15. II. *CAUSES*.—The causes of the varieties of herpes are often very obscure; and consist rather of some anterior disorder of the constitution, characterised by deranged digestion and excretion, and by vascular irritation; than of direct agents. The truth is, that they are altogether symptoms of

pre-existing disorder of the system, implicating especially the digestive, the biliary, and excreting functions. They do not depend upon contagion, and they may occur several times in the same person. They are often an advanced symptom, which frequently proves critical, of catarrhal, febrile, or inflammatory affections. — *a. Herpes Zoster* is most commonly observed in persons having delicate and irritable skins, between twelve and thirty years of age; but it is also met with in the aged. It is most prevalent in summer and autumn; and is generally dependent upon derangement of the biliary organs and digestive canal. — *b. Herpes Circinnatus* is common in children, especially in girls of a delicate frame, with thin irritable skins, and often depends upon the same internal disorder as the foregoing. — *c. Herpes Labialis* is often consequent upon catarrhs produced by vicissitudes of temperature; but in its more chronic states it is usually connected with derangement of the organs of digestion. — *d. Herpes Præputialis* is frequent in middle aged men, or in those advanced in life. It sometimes accompanies stricture, or an irritable state of the urethra, or disorder about the neck of the bladder. More frequently it depends upon acrid secretions from the root of the glans. It is independent of the use of mercury; as it is also of affections of the urethra, although often connected with these affections. It is frequently symptomatic of chronic derangement of the liver and digestive tube. It is non contagious. — *e. Herpes Iris* is most common in children and fair delicate females. It may also be considered as dependent upon internal disorder. — All the varieties of herpes occasionally appear after unwholesome articles of food, and other errors of diet; and after perturbations of the mind, especially when disorder of the digestive functions had previously existed.

16. III. DIAGNOSIS. — Herpes was often confounded, by writers previous to WILLAN, with erysipelas, impetigo, and eczema. — *a.* It is to be distinguished from *Erysipelas*, by the numerous, small, clustering vesicles; by the healthy surface between the clusters; and by the absence of redness and tumefaction before the vesicles appear; and from *Pompholyx*, by the vesicles arising in groups or patches on an inflamed base. — *b.* Neither *Eczema* nor *Impetigo* assumes the purely vesicular form, nor runs the same course, within a limited time, nor forms the dry harsh scab, which characterises herpes. — *c. Herpes Circinnatus*, when appearing on the forehead, and at the roots of the hair, may be mistaken for *Porriigo scutulata*, but the vesicular form of eruption, the regular course it pursues, and the persistence of the hair, distinguish it from this affection. — *d. Herpes Præputialis* may be confounded with *syphilitic pustules or ulcers*. The common chancre commences by a single pustule, whereas the herpetic affection consists of a cluster of vesicles; the thick scabs of the former differing from the skin incrustations of the latter. When herpes is seated on the inner surface of the præpuce, and has passed into the state of excoriation, the diagnosis is more difficult. But the superficial clustering character of the sore is different from the deep ulcer of syphilis, with its hard elevated edges, and the small grey-coloured false membrane covering its bottom.

17. IV. TREATMENT. — *A.* This is nearly the

same in all the varieties; and should be based upon the pathological dependence of the disease insisted upon above (§ 15.) Keeping the connection of the eruption with disorder of the digestive organs closely in view, a mild ipecacuanha emetic should be exhibited, and subsequently any gentle purgative, with magnesia or an alkaline carbonate. Afterwards a free use of diluents and abstinence are all that will be required in most cases. In the more severe attacks, especially of herpes zoster, additional means will often be called for. Where there is much antecedent or attendant fever, M. RAYER advises a moderate bleeding, or the application of a number of leeches to the anus, or around the seat of eruption. Neither of these is often necessary. When the evacuations are morbid, and the biliary functions impaired, a dose of blue pill, or of calomel, at bed-time, and a mild purgative, containing an antacid, the following morning, will generally be of service. It may be even requisite to repeat these; and afterwards, particularly when the urinary and faecal excretions are disordered, to promote the actions of the liver and kidneys, by small doses of colchicum with magnesia or an alkaline subcarbonate. In the more painful cases of zona, these means will be found most beneficial. During the course of the complaint, the diet should be mild, chiefly farinaceous, and in small quantity. The beverages should be demulcent and cooling.

18. *B.* When herpes assumes a chronic character, owing to the successive eruption of clusters of vesicles, or to the excoriation of the inflamed skin, small doses of blue pill, or of the hydrargyrum cum creta, and mild stomachic aperients, are the most appropriate means. In addition to these, the decoction of sarsa, or of the elm-bark, with liquor potasse, are often very serviceable. In *herpes labialis*, and *herpes præputialis*, these remedies are especially required. In more obstinate cases, particularly when the excretions continue disordered, mild stomachic purgatives, and alteratives, should be persisted in; and warm or tepid bathing, or even vapour baths, occasionally employed. In *herpes iris*, the warm bath, and minute doses of the arsenical solution with the liquor potasse, are generally of service. Dr T. THOMSON, recommends, for this species, a decoction of the *Rupex obtusifolius* with these alteratives.

19. *C.* When herpes occurs in cachectic or aged persons, not only should great attention be paid to the state of the excretions, all faecal and morbid accumulations being duly evacuated; but the digestive and assimilating functions ought to be promoted, by exhibiting gentle tonics, with the alkaline carbonates. If the eruption ulcerate, the application of nitrate of silver, in substance, or in a strong solution, will promote cicatrisation. If there appear a disposition to slough, the preparations of bark, &c. will be required. When violent sub-cutaneous pains accompany zona, hyocyanus or other narcotics may be given with the medicines already recommended; but the warm or vapour bath, and colchicum, as above prescribed (§ 17.), will be found the most successful. In *herpes præputialis* and *herpes vulvæ*, the early application of nitrate of silver will often shorten the duration of the eruption. Where there are much heat and stinging of the parts, a wash containing the subborate of soda, or the

sulphate of zinc, or of alumina, will often be useful. These may also be prescribed in herpes circinnatus; but in all cases the chief attention must be directed to the removal of disorder in the digestive and biliary organs, and to the regimen of the patient.

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HICCUP.—**SYN.** *ἀνγξ, αὐγός*, Hippocrates. *Singultus*, Pliny, Sauvages, Vogel, Sagar. *Lygma*, Swediaur. *Pneusis singultus*, Young. *Clonus singultus*, Good. *Hoquet*, Fr. Glucksen, Schlucken, Germ. *Singhiozzo*, Ital. *Hiccough*, *hocket*, *hickup*.

CLASSIF.—4. Class, 3. Order (Good).
II. CLASS, III. ORDER (Author).

1. **DEFIN.**—An uneasy sensation at the præcordia followed by a rapid contraction of the diaphragm, of momentary duration, causing an audible inspiration, iterated at short intervals.

2. **i. Description.** Although hiccup is frequently symptomatic of dangerous maladies, and is even a fatal sign in these, yet it is occasionally the chief and primary disorder. When it is thus idiopathic it is generally a slight and evanescent affection. It consists of a sudden and rapid contraction of the respiratory muscles, of the diaphragm especially, instantly followed by relaxation, thereby causing as rapid an inspiration, which is audible from its suddenness and force. These con-

vulsive movements return at short intervals, and are attended by painful uneasiness at the præcordia and epigastrium, increasing with the frequency of the convulsive contractions and continuance of the disease.

3. **ii. Causes.**—Hiccup occurs frequently in infants and young children. It is not uncommon in aged persons; and, at these epochs, is generally symptomatic of irritation of the stomach or duodenum, or produced by a too precipitate deglutition, the movements which accomplish this process often taking place in an irritable or spastic manner, in persons at the two extremes of existence. The arrest of the alimentary bolus in the oesophagus; an insufficiently masticated or dry state of the bolus; an irregular or precipitate performance of deglutition, especially, when the stomach is empty or debilitated; the ingestion of highly seasoned or stimulating food or drink, or of cold fluids; laughter, particularly in hysterical females; long fasting and emptiness of the stomach; irritating or poisonous substances in this organ; worms in the digestive canal; and wearing strait-laced corsets, are the most common exciting causes of the less important and idiopathic cases of this affection.

4. Hiccup may be one of the forms in which hysteria manifests itself, particularly when hysterical patients have been subjected to mental emotions, as after crying or laughing. It may also follow a fit of cough or vomiting; or it may be produced by sudden frights. But in all these, debility, especially of the digestive organs, is a predisposing cause. It is often a symptom of irritation or inflammation of an adjoining viscus, particularly of the convex surface of the liver, and of the stomach, especially at its cardiac orifice. It may arise from the passage of biliary calculi along the ducts, or from calculi in the kidneys or in their passage into the ureters. Strangulation of internal parts, irritating matters in the colon, external injuries and fractures of the ribs, the various stages of pregnancy, and the suppression of accustomed discharges and eruptions, have severally produced it. Besides, singultus occurs in a great number of acute diseases and fevers, particularly towards the close of life. It usually attends fatal cases of inflammation of the abdominal viscera, and is generally present when hepatitis of the upper or posterior parts of the liver extends to the diaphragmatic peritoneum, or when abscess of this organ points upon the diaphragm.

5. When singultus occurs after a too full meal, or after the ingestion of cold or irritating fluids, which is very common, it is comparatively of little import, further than that it evinces a debilitated state of the stomach and increased irritability. But when it follows a meal either frequently or habitually, chronic inflammation of the stomach, especially about the cardiac orifice, or even of the oesophagus or duodenum, should be suspected; or irritation of the pancreas or biliary ducts, or worms in the alimentary canal may exist. When depending upon this latter cause, it sometimes alternates with sneezing and pruritus of the nostrils.

6. Authors have recorded numerous instances of hiccup continuing from two to three days to many months, or even longer, in some cases without any other very prominent symptom of disease; in others, alternating with sneezing, syncope, or hysteria. Various anomalous cases of this affection have been recorded by *Potzsius*, *Schenck*,

BARTHOLIN, ALBERTI, LANZONI, HOFFMANN, BAUER, PARR, and others. Most of these have arisen from some permanent source of irritation, as biliary or urinary calculi; or have been one of the many manifestations of hysteria. The only instances of persistent hiccup that I have observed, were referable to these sources, or to uterine irritation.

7. iii. The lesions of structure most frequently observed in those who have experienced this affection in a remarkable manner, have been chiefly the following:—The usual appearances and results of inflammation of the peritoneum pleura, diaphragm, liver, stomach, or other adjoining viscera; encysted or other tumours connected with, or pressing upon, the diaphragm or its crura; scirrhus of the cardiac orifice of the stomach, or of the pancreas; morbid structures developed about the root of the mesentery; calculi, and abscesses in the kidneys, or calculi in the gall ducts; tumours pressing upon the eighth pair of nerves; and albuminous or other fluids effused into the sacs of the pleura, or into the peritoneum.

8. iv. Of the diagnosis and prognosis of singultus it is unnecessary to make any specific mention. The former is obvious: the latter may be inferred from what has been already stated. When hiccup is the primary disorder, and quite independent of internal inflammations, or of fever, a favourable result will generally follow, although it may be more than usually severe or frequent in its attacks. But when it is a symptom of these maladies, and appears at a far-advanced stage of acute or chronic diseases, it is generally a fatal indication. Cases, however, will occur in which the experience and pathological discrimination of the practitioner will be severely tried in giving an opinion as to the result.

9. v. *Treatment.* The means of cure in this complaint should be selected with strict reference to the causes and pathological dependency of it.—*A.* In the primary or idiopathic forms of it, the administration of opium with ether, or of other anodynes and diffusible stimulants, and of refreshing alkaline beverages, will generally give relief. Various antispasmodics, volatile nervatives, and sedatives, especially camphor, ammonia, hyoscyamus, hydrocyanic acid, either taken into the stomach, or inhaled into the lungs with warm vapour, will often remove the complaint. Idiopathic hiccup also may cease spontaneously; or it may be arrested by exciting some powerful mental emotion, as surprise, fright, &c., or by powerfully exciting the diaphragm by sternutatories or emetics; or by taking any substance in quantity into the stomach. When its continuance or severity requires medical interference, the pathological knowledge and diagnostic acumen of the physician are often put to the test, as either the absence of other symptoms, or their equivocal nature, renders it doubtful to what cause it should be assigned. In those cases, the chest and abdomen ought to be minutely examined before any opinion is formed.

10. In obscure or doubtful cases, camphor, with or without the nitrate of potash; the spiritus aetheris nitrici, or the spiritus aetheris sulphurici comp., or the tinctura camphoræ composita may be given with demulcents. The alkaline sub-carbonates may also be exhibited with hyoscyamus, or with colchicum, opium; or the hydrocyanic acid may be given in an aromatic or gently tonic infusion. If there be reason to refer the affection

to irritation in the kidneys, or in the biliary ducts, demulcents with camphor, and the sub-carbonates of soda, &c., will generally be of service. If it appear to depend upon worms, the treatment should be directed accordingly. When it is referrible to inflammatory action in the stomach, or duodenum, full doses of calomel with opium and small quantities of camphor, general or local depletions according to circumstances, and cathartic enemata, are chiefly to be depended upon. Even in the more obscure, and non-febrile cases, which may resist soothing and antispasmodic remedies, cupping over the hypochondria, or along the vertebral column, as recommended by J. P. FRANK, followed by blisters, sinapisms, moxas, the warm turpentine epithem, or other counter-irritants, in the same situation, may be prescribed. In cases where vascular depletion seems inadmissible, advantage may be derived from dry-cupping, as advised by RIFDLIN, CLEHORN, and HUFFLAND. Besides these, the tincture of nuxvomica has been employed by RANOX; and the cajuput oil, by VOOEL.

11. When this affection is merely a form of hysteria, or is connected with uterine irritation, cold aspersions of the surface; refrigerants with camphor, and the other means usually employed in that complaint are indicated. When it assumes a periodic character the sulphate of quinine, and other preparations of bark may be prescribed, with sulphuric acid, and sulphuric ether. Repeated doses of magnesia with ammonia and aromatics; the carbonates of iron, and other preparations of this metal; the sub-nitrate of bismuth; the various preparations of zinc; and lastly, electricity or galvanism in the direction of the spine or diaphragm, have severally been recommended.

12. When hiccup is a distressing symptom about the fatal termination of disease, large doses of camphor, of ammonia, or of musk, and opiate frictions, &c., have generally been prescribed; but these can only palliate, and very frequently they are inadequate to accomplish this intention.

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HOOPING-COUGH.—**SYNON.** *Pertussis*, Sydenham, Huxham, Cullen, Darwin. *Tussis Ferina*, Hoffmann. *Tussis Convulsiva*, Sauvages. *Tussis Quinta*, Schenck. *Tussis Clangosa*, Bourdeijn. *Tussis Delassana*, *T. suffocans*, *T. Amphimerina*, *T. Tussiculosa*, *T. Stomachalis*, *T. Spasmodica*, Auct. var. *Pneusis Pertussis*, Young. *Bex convulsiva*, Good. *Bronchitis Epidemica*, Marcus. *Bronchitis Convulsiva*, Prunel. *Bronchocephalitis*, Desruelles. *Coqueluche*, Maladies Cuticulaire, Tour Quinteuse, Fr. Keikhusten, Kikhusten, Krämpfhusten, Germ. Kikhosta, Swed. Pertosse, Ital. Whooping-cough, Chin-cough, Kin-cough, Kinkhost.

CLASSIF. — 2. Class. 3. Order (Cullen).

2. Class 2. Order (Good). II. CLASS, III.

ORDER (Author, in Preface).

1. DEFIN. — *Convulsive and suffocative cough, accompanied with a reiterated hoop, or consisting of many successive short expirations followed by one deep and loud inspiration, and these, alternating for several times; occurring in paroxysms, ending with the expectoration of tough phlegm, and frequently with vomiting; infectious and often epidemic; appearing but once during life.*

2. M. GUERSANT defines hooping-cough to be a catarrhal affection of the air-passages, characterised by sonorous inspirations with imminent suffocation. The origin of this disease is obscure; for, if the ancients have at all observed it, they have not described it so as to enable us to recognise it. Doubtless new maladies may develop themselves in the progress of the refinements of society, and of the changes which the physical and moral world have undergone during a lapse of ages. This cannot be denied in respect of some of the exanthemata, or of diseases propagated by a specific virus, as smallpox. But, excepting these, it is difficult to admit, that those maladies the spread of which very much depends upon atmospheric vicissitudes, and epidemic constitutions, and upon general susceptibility of the species, can have been of modern occurrence entirely. It is not easy to conceive why a disease should not have at least occasionally appeared; since the circumstances favouring, and causes inducing, it must have been in existence from the earliest ages. It may be said of hooping-cough, as of some other diseases, that, although the more exact observations and descriptions of modern observers have made it known only in comparatively recent periods, yet it may have existed nevertheless, and have been unknown from having been confounded with other maladies resembling it.

3. The passages in HIPPOCRATES that may be referred to this disease, are equally applicable to several other catarrhal affections, or disorders of the respiratory organs. Some of the older writers take notice of epidemics, which have been considered to have been hooping-cough, especially those of 1239 and 1311. But they may have been severe catarrhal epidemics, or influenza. ROSEN thinks, that pertussis passed from the East Indies and Africa into Europe; but of this he has furnished no satisfactory proof. According to MEZENAY, it first appeared in France in 1414; and he has been generally considered as having given the earliest account or description of the disease. But, upon referring to this writer (*Abregé Chron. ou Extrait de l'Hist. de France*, t. iv. p. 65.) there is nothing but the name *Coqueluche* that is applicable to it. Indeed his account would have been quite applicable to the influenza of January, 1837. The epidemics noticed by DE THOU, and PASQUIER, to which the same name was given, and which occurred in 1510, and 1557, were evidently influenza, and not hooping-cough; and the same remark is applicable to most of the supposed epidemics of this latter disease, during the sixteenth and seventeenth centuries.

4. WILLIS was the first who accurately described hooping-cough under the name of "*Tussis puerorum convulsiva, seu suffocativa, et nostro*

idiomate chincough vulgo dicta." (*Opera omnia*, Amst. 1682. vol. ii. p. 169.), and it is only from his time that we have any account of the disease that can be relied upon. It was afterwards noticed by SYDENHAM, (*Op. Universa*, Lugd. Bat. 1726. p. 311.), and by both it was treated of as a common disease. It is extremely doubtful that the epidemics of the 15th and 16th centuries, which proved so very fatal were actually this complaint. The imperfect notices made of them convey nothing really proving that they were it. ROSEN confesses, that he cannot determine when pertussis first appeared in Sweden; and, as respects this country, there is no account earlier than that of WILLIS which can be received.

5. I. DESCRIPTION. — Hooping-cough, whether in an epidemic or sporadic form, presents nearly the same phenomena, particularly when it is simple or uncomplicated. But it is modified in many respects by the season, climate, constitution or habit of body of the patient, and by the complications which take place in its early stages. I shall, therefore, describe, first, its simple or uncomplicated form, and, secondly, the complications which it frequently presents.

6. i. SIMPLE HOOPING-COUGH. — Pertussis has been divided into two stages by some writers, viz., the *catarrhal* and the *convulsive*; and into three by others, the second stage being divided by the latter into the periods of convulsion, and of decline. A. The stage of development, or the catarrhal period, is generally announced by some slight rigors or chills, turgescence of the face, slight redness of the conjunctiva, watering of the eyes, and the signs of simple coryza. There is scarcely any fever, sometimes only, for twenty-four or thirty-six hours; but, in some cases, the fever is more marked, and it occasionally assumes a quotidian or tertian type. The cough is more or less frequent, comes on in fits, and may at this time be taken for common catarrh, or catarrhal affection of the trachea and bronchi. However, a slight shade of difference may be detected in the tone of the voice, which experienced observers will recognise as characteristic of the disease. The cough is more sonorous, and more acute than in bronchitis; expectoration is scanty, even with adults, and the matter brought up is limpid, as at the commencement of catarrhal affections. The anterior part of the neck is sometimes uneasy, or even painful, but in other respects there is little complaint, excepting a slight depression of spirits, moroseness, heaviness, diminished appetite, and sluggish bowels. This period generally continues from five to twelve days, and seldom more than fifteen.

7. B. In the *Convulsive, Spasmodic, or Nervous Stage*, the patients complain frequently of uneasiness or pain under the sternum; the fits of cough are longer, more frequent, particularly at night, and commence with unpleasant titillation at the larynx, during which the expiratory and inspiratory movements are irregular and incomplete, chiefly in very young children, who evince considerable dread of the attack. This state is attended with anxiety and a slight mucous rattle. On the accession of the fit, infants grasp persons or objects that are near them, or upon awakening from sleep start up. Each accession consists of a very dry, sonorous, spasmodic cough; the contractions of the respiratory muscles, being so quick, and succeeding each other so rapidly,

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and attended with so much constriction of the larynx, that the patient cannot breathe and seems almost suffocated. The face and neck are swollen, injected, and violet-coloured; the jugular veins are gorged; the eyes prominent, injected, and watering; and the paroxysm terminates with one or two long incomplete inspirations, attended with that peculiar noise from which the disease has generally derived its designation. Sometimes the fit of cough is interrupted during one or several minutes, and is resumed; but does not cease entirely until the patient rejects, by a sort of regurgitation, a rosy and limpid fluid, which comes partly from the bronchi, and partly from the stomach, as shown by the presence of portions of ingesta, and of bronchial mucus. In some cases, when vomiting does not accompany the paroxysm, this particular fluid proceeds chiefly from the air-passages; in others, particularly in those accompanied with vomiting, it is chiefly from the stomach. It is sometimes sanguinous, either in streaks or specks; and when the paroxysms are severe, blood sometimes escapes from the nostrils, and even, in rare cases, from the ears and eyelids. The termination of the paroxysms is often attended by a watery secretion from the eyes. Crying, mental irritation, or opposition, frequently bring on a fit; and even the sight of another in the paroxysm, will induce it in those affected by the disease. The fits are generally much more severe after a meal, or after running, or other very active exercise. Their number varies with the severity of the disease, from five or six in the twenty-four hours, to one every ten or fifteen minutes; they are generally severer, and more frequent during the night than in the day. On applying the stethoscope or the ear to the chest, on the accession of the paroxysms, a mucous rattle may sometimes be heard; but frequently no unnatural noise can be detected, unless the disease is complicated with bronchitis. During the paroxysm the respiration is so far suspended as not to be heard in any part of the lungs; but at the moment of inspiration, the air is precipitated by a loud hissing sound, as far as the bifurcation of the bronchi, where it seems to encounter some obstacle, as it does not pass further for one or two seconds. This stage usually continues from fifteen days to a month, or even longer. During its course, the fever, which had been either scarcely perceptible or but slight, but had been suspended after the invasion of the disease, is, in some cases, rekindled with more force, assuming the continued or intermitting type. It is chiefly during the early part of this stage that pertussis becomes complicated with, or excites, bronchitis or other disease of the lungs. Yet such complications occur at various intervals from the attack, and sometimes even accompany the first stage. But it is generally during this period that affections of the head, or of the abdominal viscera, supervene, which, with lesions of the lungs, occasion unfavourable terminations. However, when the disease is slight and uncomplicated, it is without fever, the patients preserving their usual health and appetite, which may be even more craving than usual.

8. C. The *Stage of Decline* is of indeterminate duration, occurring from three to five weeks after the invasion of the disease, and continuing from twelve days to two or three months. It may be said to commence from the time of the paroxysms being more distant and shorter than in the pre-

ceding period, and by their termination, in the excretion of an opaque and thickish matter, as in the last stages of catarrh, and in the vomiting of alimentary matters. The fits become insensibly feebler during this stage; the cough gradually loses the characteristic whoop, and approximates nearer that attending the last stages of catarrhal affections. Sometimes the patient will remain for a day or two, or even longer, without cough; but on exposure to cold, change of temperature or weather, or after errors of diet, it returns with similar characters. In some seasons especially, as during autumn, and at other seasons on the occurrence of easterly winds, I have seen the paroxysms of cough return, with the same characters after a fortnight, a month, or even two or three months, of perfect and apparent recovery.

9. ii. **COMPLICATED PERTUSSIS.**—Hooping-cough is frequently accompanied with, or occasions, in its severer forms, or in predisposed subjects, most serious affections. It may even attack patients already suffering or convalescent from disease; and although occurring under such unfavourable circumstances, may not be severe and may terminate favourably, although in other cases it will often aggravate the pre-existing or accompanying malady—so much so as even to lead to a fatal termination. The complications of hooping-cough vary extremely, according to the season of the year, the state of the weather and atmospherical vicissitudes, the character of the prevailing epidemic, and the habit and temperament of the patient. They constitute the most important features of the disease, inasmuch as the danger depends entirely upon the particular form of complication present. The success, also, of the practitioner will mainly depend on the celerity and accuracy with which he may detect existing or incipient states of super-added or contingent disease, and the decision with which he may treat them. The importance of attending closely to the progress of whooping-cough, even in apparently favourable cases, must be apparent to those who have had occasion to observe how insidiously diseases of the substance of the lungs, or of the brain, have supervened and advanced even to an irremediable degree, masked by the cough, so as to have failed of attracting the attention of parents or those around the patient; or, if they have attracted notice, to have been mistaken for a symptom merely of the simple and less dangerous affection. I have frequently been called to children dangerously affected with disease of the lungs or brain, which had been in existence for many days before attention had been excited by it. Considering the complications of pertussis most important, I shall treat of them somewhat in detail.

10. Pertussis, in either an epidemic or sporadic form, particularly the former, sometimes follows rapidly upon measles. Occasionally it appears during convalescence from that complaint. In such cases disease of the lungs, particularly bronchitis, pneumonia, pleurisy, tubercles, &c., often steals on without being suspected until it has made a formidable progress, or passed beyond the reach of aid. The previous disease, and the treatment employed for it, has often induced that state of the system which does not evince the complication by many of the usual symptoms which characterise it, in the idiopathic or primary form; and it is chiefly by attentive observation of

the pulse and respiration, in the intervals between the paroxysms, and of the expectorated matter, and by examining the state of the lungs by means of percussion and the stethoscope, that we can detect the complication or judge of its nature and extent. In infants with a narrow, or malformed chest, there are often great dyspnoea, frequency of pulse and of respiration, sometimes even without much serious disease of the lungs, beyond slight bronchial irritation. The most common complications of whooping-cough, especially from two or three months old to seven or eight years or later, are *croup*, *bronchitis*, *pneumonia*, *pleurisy*, *pneumothorax*, *adema of the lungs*, *hydrothorax*. In all these the respiration is difficult, frequent, and embarrassed; the countenance and extremities are turgid; and there is continued frequency of pulse. The expectoration terminating the paroxysms, varies according as either of the above lesions is present. It is generally much diminished, and, in proportion to the severity of the organic disease and of the accompanying fever. But the extent and nature of the complication should be carefully determined by the stethoscope and by percussion. In somewhat older children, and in those advancing nearer to puberty, who are of a scrofulous habit, and hereditarily disposed to phthisis, hæmoptysis, sometimes to a considerable extent, takes place, and in these subjects particularly, tubercular disease of the lungs is not infrequently developed, either with or without hæmoptoe.

11. *B.* In infants and young children, the functions of the brain, and the symptoms, indicating disturbance of this organ, should be carefully watched for, particularly those indicating *cerebral congestion*, *hydrocephalus*, *meningitis*, or *cerebritis*; and if any of these symptoms occur, and especially if attended by continued fever, by screaming, or by rolling of the head, or convulsions indicating meningitis, or hydrocephalus; or by somnolency, falling of the eyelids, cool state of skin, inability or disinclination to move or be moved, with dilated pupil, &c. indicating cerebritis, decisive treatment should be adopted, as recommended for these maladies.

12. *C. Diseases of the Abdominal Viscera* are much more rarely complicated with whooping-cough than those already mentioned; however *diarrhæa*, chronic irritation of the stomach and bowels, remittent fever, inflammation of the mucous surface of these organs, are not infrequent attendants upon it. Sometimes, even, inflammation of the peritoneum and mesentery will occur, during the advanced stages of whooping-cough, and I have occasionally also met with inflammation of the cæcum and colon, and pericarditis. These complications, particularly those of the digestive mucous surface, may superinduce others, as enlargement of the mesenteric glands, and affections of the cerebral organs, rapidly terminating in effusion.

13. With respect to all these complications, it may be generally remarked, that they are attended by more or less fever of a continued or remittent type, and with paroxysms of cough, more or less dry and severe. Sometimes the febrile exacerbations and remissions are well marked, especially when the complication is in the abdominal cavity. The expectoration terminating the fits generally diminishes as the complication increases in severity, and the vomitings often disappear. The paroxysms also are followed by more sensible prostration of

strength.—Having thus taken a general view of complicated pertussis, I shall next more particularly notice those complications which most commonly occur, and which frequently superinduce further disease especially in connected or associated structures.

14. *D. Pertussis associated with Bronchitis* is extremely frequent during spring and winter, and in this climate, especially in the months of February, March, and April, owing to the prevalence of easterly winds at that season. 1. It may precede whooping-cough; 2. It may be coeval with it; and, 3. It may supervene in the course of the disease. The last is most common. Whenever bronchitis appears, there are always decidedly febrile symptoms during the intervals between the paroxysms of cough. The breathing is also much accelerated, and when examined by auscultation is accompanied by the mucous rattle, and occasional temporary suspension of the respiratory sound in parts of the lungs, owing to the accumulation of the mucous secretion for a while in one or more of the bronchial tubes conveying air to those parts of the organ. The expectoration also from being clear, whitish, and ropy, becomes more opaque, less fluid, gelatinous, and less abundant. The paroxysms of cough are much more frequent, and often accompanied with a feeling of oppression in the chest, and are less constantly followed, or even not at all, by rejection of the contents of the stomach. The chest sounds well upon percussion, and the patient lies on the side most affected, or in slighter cases on either side. When the bronchi of both lungs are generally affected, he is unable to lie on either side, or is incapable of lying down at all.

15. This complication often terminates fatally, either from obstruction of the air-tubes by the accumulation of tenacious mucus, together with spasm about the larynx, occasioned by the nervous character of the disease, and the irritation of the glutinous secretion, the patient dying asphyxied; or from congestion of the vessels of the head, owing to the paroxysms of cough, the obstruction produced by the mucus in the air-passages, and the difficult circulation through the lungs; or from the inflammatory action having extended to the trachea and larynx, or to the minute bronchi and substance of the lungs, terminating in condensation. &c. of the structure of the organ, &c. In some cases, owing to the treatment employed and constitution of the patient, the acute form of the bronchial affection gradually subsides until it arrives at a milder state; when, owing to the incapability of the vessels to assume the healthy state, a chronic form of disease continues long afterwards, which may be removed, in some cases, by judicious management; but which terminates in ulceration of the mucous membrane, or gives rise to tubercles, to chronic pleuritis, or other lesions in the thoracic cavity. This complication is frequent from six or seven months upwards, and especially during the second, third, and fourth years of age.

16. *E. Hooping-cough associated with pneumonia and pleuritis*, is very frequent in the spring during easterly or northerly winds, particularly when these follow heavy falls of rain and open weather. It is more common in some epidemics than in others, and is met with at all ages, but most frequently from one to six or seven years or upwards;

and in children of a full habit of body, sanguine temperament, and strumous diathesis, it may be nearly coeval with the pertussis; but it more commonly supervenes in the course of the disease, the inflammation commencing often as bronchitis and extending in parts along the smaller ramifications of the bronchi, to the air-cells and substance of the lungs. In some cases, *pleuritis* supervenes to the pneumonia, and in others a portion or a whole lobe of the organ, and the pleura covering it, seem as simultaneously affected. It is very difficult to ascertain the existence of this complication in infants and very young children, but auscultation and percussion furnish considerable aid to the diagnosis.

17. The *Symptoms* of this complication vary according as the inflammation of the lungs and hooping-cough are coeval affections, or as the one may supervene to the other. When the affection of the lungs or pleura is present from the commencement, the cough occurs frequently, in short paroxysms, and is seldom followed by the rejection of the contents of the stomach. The pulse and respiration are quick, hard, full, and hurried; the *æsnasi* and diaphragm labour much during the respiratory motions, and the cough is without the attendant hoop, and does not terminate in vomiting, as the complication becomes developed. When it has been consequent upon the bronchial complication, wheezing, and difficult expectoration are generally present; and the sputa become thick, opaque, glutinous, puriform, or streaked with blood. The prostration of strength is also great. There is a dull sound given out upon percussion of the thorax, over the seat of the disease. On examining the chest with the stethoscope, the signs enumerated in the pneumonia of children are more or less manifest (see art. *LUNGS—Inflammation*).—When the *pleura* is implicated the cough is more suppressed, and pain is complained of in some part or other of the thorax; yet this latter symptom is not always prominent. In addition to the other stethoscopic signs, the metallic trickling is often present. In the worst cases of this complication, as in those of the preceding, the lips assume a livid hue, and the extremities become cold, or even of a leaden colour. This complication often terminates unfavourably in a short time. During its continuance, the hooping-cough presents characters much less distinct, but which become more pronounced as the inflammation is subdued.

18. *F. Complications with tubercular Phthisis, hydro-thorax, or pneumo-thorax*, are rarely or never met with, unless as the consequences of one or other of the foregoing, or in the far-advanced stages of pertussis; and are, therefore, unfavourable terminations, rather than complications, of the disease, arising out of neglect or inappropriate treatment, or constitutional predisposition. The state of the expectoration and hectic symptoms, and the signs furnished by auscultation and percussion, will enable the practitioner to detect either of these terminations.

19. *G. Pertussis associated with inflammatory irritation of the Membranes or Substance of the brain, or occasioning Hydrocephalus*, is very common, particularly in infants, about the period of dentition, or from six months to two or three years of age. In these, convulsions in various forms, spasm of the glottis, screaming, &c., are

of frequent occurrence, and indicative of this complication, which is often more prevalent in some epidemics than in others. Congestion of the brain, owing to interruptions to the return of blood from it, during the paroxysms of this disease, often terminates in effusion, capillary reaction, or even softening of parts of the organ. The spasms and convulsions which generally attend these affections of the brain in infants and young children, rarely carry off the patient. They are rather the indications of that state of disease of the substance or membranes of the brain, which terminates in softening of the central parts, and in serous effusion into the ventricles. Whenever the paroxysm of cough is increased in violence, the characteristic hoop disappearing, the face becoming very livid, and the thumbs drawn into the palms, cerebral congestion, with its attendants and consequences, should be anticipated. In some cases, but by no means frequently, the swelling on the tops of the fingers and toes, noticed by Dr. KELLIE, and the crowing inspirations indicating spasm of the larynx (see *LARYNX*) and threatening suffocation, are observed, generally at early stages of this complication. When the convulsions affect one side of the body more than the other, and especially if one side or limb be paralysed, softening of some of the more central parts of the brain and serous effusion may be inferred.

20. In all cases of pertussis, when it is followed by burning heat of the surface; pains of the head, with obscure redness of the conjunctiva; a fixed, brilliant, dry, and peculiar appearance of the eye; unusual redness or pallor of the face; very torpid bowels with morbid excretions; irritability of stomach independently of the fits of cough; aversion from light or noise; heaviness or drowsiness and languor; grinding of the teeth; or sudden starting or shocks of the body in sleep; rolling or tossing back the head, and piercing screams; are observed, then irritation of the brain or its membranes, which will soon pass into organic change and effusion, is manifestly present, whether there be convulsions or not. When stupor or unconsciousness has come on, with one arm waving in the air, or tossed over the head, whilst the other is paralysed, a farther advanced state of disease than mere inflammatory irritation, as softening or effusion, may be inferred.

21. *H. Pertussis associated with Disorder of the Bowels, or with infantile remittent Fever*, is not infrequently observed. In these cases the abdomen is tumid, the evacuations offensive and unnatural, the breath is fetid, the tongue loaded, and the appetite is impaired. The complexion is lost, and the eyes more sunk and heavy than in health. At last febrile exacerbations and remissions are observed generally twice in the twenty-four hours; pickings of the nostrils and lips; the cough returns more frequently and ceases to terminate in vomiting; the breathing is oppressed, hurried, and short; the expectoration, at the termination of the fits, is more scanty, but without the signs of bronchitis or of pneumonia; and emaciation proceeds. If this state of disorder continue, effusion in the ventricles of the brain may take place, or the mesenteric glands may become diseased. This complication steals on imperceptibly, and generally in the second or third stage of pertussis.

22. iii. *The Appearances observed in fatal Cases of Pertussis* show the nature and extent of the complications, rather than of the disease itself. The accounts furnished us of the fatal epidemics in former ages, contain no details of the appearances after death; and even the more recent researches of WATT, MARCUS, WATERTON, GUIBERT, DESRUILLAS, GUERSENT, and others have thrown little light upon the nature of the malady, although they have illustrated the changes which often supervene in its course. The lesions, which are most constantly observed, are more or less redness of the mucous surface of the trachea and bronchi, with considerable tumefaction of the glands at the bifurcation of the latter. These tubes contain a considerable quantity of aropy or more or less thick mucus. In the bronchitic complication these changes are still more marked, and in infants the thymus gland is often unusually large. Inflammations of the lungs, or of the pleura, or of both, in all their phases and stages; and effusions into the pleural cavities; with or without adhesions or false membranes, are not unusual, but are observed only in cases of the pulmonary complications described above. They are generally associated with mucopuriform matter accumulated in the bronchi, and splenification or condensation of several lobules or portions of the lungs.

23. When the disease induces chronic bronchitis or tubercular consumption, whether hæmoptoe hæmoptoe occurred or not, the mucous membrane of the bronchi has been found thickened, softened, rarely ulcerated in some points and injected, and tubercles have been observed in all stages of development and softening, and accompanied with ulcerated excavations. Tubercular changes are, however, not very common in young children. Dilatation of the bronchi is sometimes observed; but I have not met with it so often as LAENNEC believes it to occur. It is to be looked upon as a remote consequence of the disease in prolonged cases. M. BRZSCHKE observed, in two instances, injection of the pneumo-gastric nerves: but MARCUS, GUERSENT, and myself have not found these nerves materially changed.

24. The morbid appearances found within the cranium have been chiefly consequent upon the cerebral complications, and have consisted of softening of the central parts of the cerebrum; effusion into the ventricles, or between and beneath the membranes; congestion of the vessels, &c. As far as my dissections have gone, inflammatory appearances have been observed in the medulla oblongata; or in its membranes, even when no other remarkable lesion was present within the cranium. Whether this change be a consequence of the disease or not, is difficult to determine; but there can be little doubt that those found in the brain are merely remotely consecutive lesions.

25. The stomach usually presents no particular lesion; but I have observed inflammatory appearances in the oesophagus, and the same have been remarked by ORZANI in his numerous dissections in the Foundling Hospital at Milan. I have likewise found the mucous surface of the pharynx and epiglottis, particularly the latter, more or less inflamed, and the subjacent cellular tissue, especially at the base of the epiglottis, infiltrated and cedematous. The mucous membrane of the intestines, particularly of the caecum and colon, had been in some instances ulcerated, and the mesenteric

glands engorged; but only in protracted cases passing into infantile remittent fever. From the numerous post mortem examinations I have made, I am warranted in stating that most of the lesions observed by writers in this disease are merely effects of the complications of, and diseases excited by, this complaint; and that the parts most constantly found altered, are the mucous covering of the epiglottis, trachea, and bronchi; and of the pharynx and oesophagus; and, as respects the nervous system, the medulla oblongata and its membranes.

26. iv. *Of the Nature and Seat of Pertussis.*—SYDENHAM imputed hooping-cough to the presence of a subtle and irritating vapour in the blood, affecting the lungs and exciting the paroxysms. BOHME (*Cur-Methode der Wichtigsten, Brust Krankheiten*, Leip. 1788), conceived that it proceeded from a peculiar miasma acting chiefly on the nerves. LINNÆUS had previously referred it to the presence of minute insects in the air (*Dissect. Exanthemata Viva*, Upsal, 1757); an opinion which was partially adopted by ROSENTHAL, who, however, believed that it was propagated by a morbid principle emanating from the affected, and passing into the system of those exposed to its influence by the respiratory organs and stomach; and hence the affection of those viscera, and the irritation of the mucous glands, occasioning an inordinate secretion of phlegm.

27. WALDSCHMIDT (*Institut. Medicinæ Rationalis*, 12mo. Marb. 1688), STOLL (*Ratio Medendi*, pars ii. p. 180.), DANZ (*Versuch einer Allgemeinen Geschichte des Keichhustens*, 8vo. Marb. 1791), LENTIN (*Memorabilia*, p. 38), FRIBORO and BROUET (*Sur l'Education des Enfants*, t. ii. p. 25), ascribed the disease chiefly to gastric disorder and saburra, whilst they admitted, particularly DANZ and LENTIN, that the lungs are also much affected, but in a sympathetic manner, and that the other symptomatic disorders accompanying it vary exceedingly, whilst the respiratory functions are more constantly disturbed. CHANSON (*Des Maladies des Enfants*, t. ii. 8vo. Paris, 1799), and TOURELLE (*Éléments de Méd. Théorique et Pratique*, t. ii.), considered pertussis as a species of catarrh. The former located it in the stomach, and supposed that it is of an æsthenic nature, the cough and other nervous symptoms being occasioned by the affection of this organ. The latter extended the gastric disorder to the lungs, and regarded the disease as a pituitous pneumo-gastric affection. A similar opinion was entertained also by Dr. SYRK (HUFELAND, *Journ. d. Pr. Arzneik.* b. vii. et. iv. p. 177). GÄRDEN (*Traité des Mal. des Enfants*, p. 391.) nearly coincided with TOURELLE in referring it to a nervous irritation, *qui-generis*, causing a pituitous or increased mucous secretion from the bronchi and stomach with convulsive action of the glottis and diaphragm, and believed that it differs from catarrh chiefly in its cause and the periodicity of its character. The opinion of MILLOR was not materially different from the foregoing. He referred the disease to a spasmodic irritation of the stomach primarily, and of the lungs symptomatically, and he imputed the cough chiefly to the convulsive action of the diaphragm; but he contended that the throat and bronchi are also implicated. M. BROUSSAIS has also argued that the source of the disease is in the stomach; but he considers that it

consists of inflammatory irritation, producing an increased secretion of mucus, and that the termination of the fits in vomiting disembarasses the affected surfaces and assuages for a time the irritation. He, however, admits that this affection of the stomach is not of itself sufficient to constitute the disease, but that it is always extended to the bronchi. (*Ann. de la Méd. Physiol. Mai; 1824.*)

28. Besides those who have thus considered pertussis either catarrhal in its nature, or allied to this state, others have conceived that it is chiefly of a nervous character. Whilst the former have placed the most stress upon the catarrhal symptoms, particularly the discharge of a clear ropy mucus, and the acceleration of the pulse in many cases,—the latter have been more engaged with the convulsive features of the disease, especially the cough, its occurrence in fits, as in other nervous affections; and with the perfect, or nearly perfect, state of the functions during the intervals in the simple form of the disease.—The opinions of HOFFMANN (*Opera. Suppl. ii. pars x. p. 244.*) and of HUFELAND (*Bemerk. ueber Blattern, &c. p. 421.*), in this very nearly coincide. They both impute hooping-cough to irritation of the nerves supplying the larynx, air-passages, diaphragm and stomach; to an affection chiefly of the pneumo-gastic nerves. HUFELAND supposes that the irritation of the nerves supplying the larynx and air-passages is extended to the diaphragm by the intimate sympathy existing between these parts; that this muscle is thereby thrown into convulsive action; and that, owing to its action on the cardia, and the irritation extending to the stomach through the medium of the eighth pair of nerves, this organ undergoes energetic contraction, and evacuates its contents; the vomiting thus occasioned removing the irritation of the respiratory organs, and thereby terminating the paroxysm. Thus, the vomiting is the antagonist of the spasmodic state of the organs of respiration; and, as observed in practice, a salutary occurrence. Very nearly allied to this opinion is that proposed by JAHN (*Ueber den Keichhusten. Rudolstadt, 1808.*) He considers hooping-cough to be an affection of the phrenic nerves, occasioned by a peculiar miasm too subtle to be recognised. LOBENSTEIN-LÜBEL (*Ueber die Ang. Memb. den Keichhusten, &c. 1811.*), contends, that this disease originates in a peculiar affection of the nerves of the diaphragm; that, in its second stage, the phrenic nerves are in a state of irritation; and that, in its third, the irritation is expanded throughout the system; it thus commencing with a morbid affection of the diaphragm, which extends itself by nervous connection to the rest of the respiratory apparatus and stomach, and sympathetically, to the whole economy.

28.* According to PALDAM (*Der Späthusten. Halle, 1806.*), hooping disease depends on exalted irritability of the lungs, and of the organs most closely sympathising with them, particularly the diaphragm and stomach. Nearly allied with the foregoing opinions, is that which has been proposed by WENDT (*Die Kinderkrankh. System. &c. 8vo. Breslaw, 1822.*). He arranges hooping-cough with nervous diseases; argues against the notion of a secretion peculiar to it, yet imputes it to a certain miasm engendered by the nature of the season and constitution of the at-

mosphere, and thus prevailing generally in an epidemic form. The nerves which he considers chiefly affected, are the branches of the intercostals, the eighth pair, and the recurrent nerve; the solar plexus he views as being consecutively affected. He contends, that the disease is not a variety of bronchitis, as believed by many; and that the bronchi are only sympathetically irritated, and chiefly from the increased secretion of mucus and aqueous fluid poured into them during the paroxysm. He admits that it is generally accompanied with a phlogistic diathesis of the bronchi and substance of the lungs, but that there is no developed state of inflammation; this diathesis admitting, however, of inflammation being speedily kindled up from exposure to its exciting causes, and during certain epidemics; but when it exists, that it is merely a contingent complication.

29. M. GUIBERT (*Recherches Nouv. sur la Croup et sur la Coqueluche. Paris, 1824.*) views pertussis as essentially nervous. He considers that a common cough may pass into this affection, by having the spasmodic state of the muscles of the larynx and of the diaphragm superadded to it; and, therefore, that spasm superadded to cough constitutes the disease,—the state of spasm resulting from the high nervous susceptibility and particular disposition to it existing in child, and from individual idiosyncrasy. He supposes that, whilst the spasmodic state constituting the disease affects the muscles of the larynx and the diaphragm, in some cases this state is extended to the muscles of the head and whole body, occasioning general convulsions. The increased secretion of mucus he refers to an excited state of the mucous membrane of the air-passages, and of the pharynx, œsophagus, and stomach, existing independently of any inflammatory action; and considers that the paroxysms of cough proceed from obstruction of the bronchi by the accumulation of this secretion; the nervous symptoms being the result of the spasm, which he considers the chief agent of the morbid phenomena. But this theory leaves unexplained the precise cause and origin of the spasm, which, doubtless, affects the parts to which he refers it.

30. According to M. GUIBERT (*Dict. de Méd. t. vi. p. 6.*), hooping-cough is a catarrhal affection seated in the trachea and bronchi, consisting of a specific inflammation, accompanied with spasm of the trachea and glottis. To this opinion it may be objected, that the causes of the disease are not always of a specific character; that, although it evidently is often propagated by infection, yet it frequently occurs sporadically, and then it cannot be traced to any specific cause. When, also, inflammatory appearances are observed in the air-passages of some cases, which have terminated fatally, these differ not materially from the changes occasioned by common inflammation.

31. Dr. WARR (*Treatise on the History, Nature, and Treatment of Croup. 1812.*) considers the disease to be inflammatory, and seated in the bronchi. Dr. BARNUM, and MARCUS of Bamberg, entertain the same view as Dr. WARR. ARZENS, of Brémén, denies hooping-cough to be essentially inflammatory. He justly states, that it is never so rapidly developed as bronchitis; that it is an affection of the nerves of the chest,

frequently occurring epidemically, and generally admitting of cure without the assistance of art, unless when appearing in a complicated state, or when inflammatory action supervenes in its progress, — a termination which would but seldom occur if it were essentially inflammatory, and which seldom is observed to follow bronchitis or pneumonia when left entirely to nature. Thus, whilst ALMENS considers whooping-cough to be an affection of the nerves of the thorax, with which bronchitis is frequently complicated, WATT and MARCUS conceive that it is a catarrhal bronchitis from its commencement. Nearly similar to the opinion of these two authors, seems to be that of M. FOURCADE-PRUNET, who views it as a variety of bronchitis, without, however, stating in what the difference consists. The convulsive paroxysms of cough he attributes to the morbid sensibility of the mucous membrane of the air-passages in their inflamed state, and to the irritation occasioned by the expired air and the secretion formed on this membrane. M. BOISSEAU (*Dict. abrégé des Scien. Médicales*, t. v.) entertains a similar opinion to that of M. FOURCADE-PRUNET; and Dr. DEWEES (*A Treatise on the Physical and Medical Management of Children*, 8vo. Phil. 1825.) contends that it is a catarrhal inflammation of the respiratory mucous membrane, with an augmented secretion of mucus. Dr. DAWSON (*Noël. Treat. of Physic*, 8vo. Lond. 1824.) also believes in the inflammatory nature of the disease; but confines its primary seat to the mucous membrane of the glottis. LAENNEC regards it as a variety of pulmonary catarrh, holding an intermediate grade between the pituitous and the mucous catarrh; and he denominates it, from the convulsive character of the cough, convulsive catarrh. The expectoration he considers to be at the commencement pituitous, and towards its close nearly mucous. The absence of respiratory sounds during the paroxysms, he explains, by supposing either a momentary congestion from blood or serum, giving rise to a tumefaction of the mucous membrane sufficient to obstruct the bronchi, or to a spasmodic constriction of these tubes.

32. Dr. WERSTER (*Med. and Phys. Jour.*, Dec. 1822.) contends, that the symptoms, when closely viewed, warrant the conviction that whooping-cough depends upon inflammatory irritation of the brain, or of its membranes, or of both. A somewhat similar opinion had been given by A. LEROY (*Méd. Maternelle*, 8vo. Paris, 1803.), BOISSEAU, OTTO (*Nye Hygæa*, Aug. 1824.), and BEGIN (*Traité de Thérapeutique*, &c. t. ii. 8vo. Paris, 1825.), have admitted the frequency of the association of cerebral affection with whooping-cough, even from the commencement; whilst they oppose the inference that the latter is dependent upon the former. Dr. WERSTER is, however, the first writer who fully appreciated the influence of cerebral irritation on the respiratory organs in this disease, and excited attention to an important and early complication of it.

33. M. DESMUELLES states, that whooping-cough is an inflammation of the bronchi, giving rise, at an early period of its course, to cerebral irritation; that, as long as the bronchitis is simple, the cough is not attended by the characteristic hoop; but that, when the cerebral irritation commences, the diaphragm and muscles of the larynx, &c.

become subject to convulsive actions, which impress the cough with its peculiar features. The arguments already adduced against the inflammatory origin of the disease, are equally applicable to this view; and the constant existence of cerebral irritation is by no means proved — the occasional supervention of this irritation being all that is fully ascertained.

34. From my researches into the pathology and treatment of whooping-cough, during some years previously to 1823, I was led to consider the medulla oblongata or its membranes very early implicated in this disease; evidences of inflammatory irritation of these parts having been very generally observed in the *post mortem* inspections I had made. I conceived that the morbid impression or irritation occasioned by the exciting cause in the upper parts of the respiratory surfaces, particularly the glottis and its vicinity, affects the respiratory nerves, especially the pneumogastric; and that the irritation is extended to the origins of these nerves, where it aggravates and perpetuates the primary affection. Where no predisposing, concurrent, or consecutive causes or influences favourable to the development of inflammatory action either in the respiratory organs or in the brain exist, the morbid action does not proceed beyond an irritative state, and the disease preserves a simple form. But when such causes are in operation, the irritation passes into inflammatory action in either of these situations; in some cases extending from the epiglottis and pharynx to the bronchi and lungs, and in others from the medulla oblongata to the brain or its membranes. As the irritation increases or extends downwards along the respiratory surfaces on the one hand, or to the pharynx and gastric mucous surface on the other, and as it predominates in the one above the other, so does the disease assume more of a bronchitic or of a gastric character; the latter form being the most favourable, as tending to disembarass the bronchi, and to prevent the extension of disease in that direction. When the disorder implicates the lungs, the gastric affection either does not appear, or is thereby superseded; and when the brain becomes affected, either the gastric symptoms are not observed, or they assume different characters, appearing in the intervals between the fits of cough, instead of terminating the fits, and the cough loses its convulsive or nervous form. It does not, however, follow that the stomach is materially affected, even when the vomiting is the most remarkable. In these cases, the irritation seldom extends much beyond the pharynx; the irritation of this part and of the epiglottis, and the convulsive nature of the cough, being the principal causes of the vomiting. The copious discharge of ropy mucus, terminating the fit, partly proceeds from the pharynx and vicinity, even when there is no vomiting. Attentive observation subsequently to the adoption of these views, and extensive experience of the treatment founded on them, have confirmed my confidence in their accuracy, in the principal points.

35. I believe that the disease is chiefly nervous, in the simple cases; that it preserves this character more or less throughout, even when inflammatory complications ensue; and that, in the uncomplicated state, the nervous affection never proceeds beyond irritation. The impression made by the causes, is followed by functional

lesion of the respiratory nerves, particularly the *nervus vagus*; and, owing to this lesion, the mucous surfaces they supply frequently experience consecutive changes, as respects the state of circulation, exhalation, and secretion. Hence result increased vascular determination and augmented secretion, attended by irritation of the glottis, epiglottis, pharynx, and air-tubes, inducing convulsive action; which supervenes the more readily, as the disease is essentially nervous in its nature, but often becoming, consecutively, irritative, or inflammatory; this last characteristic being only an occasional complication, occurring from predisposition, habit of body, epidemic influence, or fortuitous causes favourable to its development. — The inflammatory appearances in the medulla oblongata and base of the brain may be owing to the functional relation of these parts to the respiratory order of nerves, which receive the first impression of disease, and whose functions are so manifestly disordered throughout, as noticed above (§ 7.); or these, as well as the consecutive cerebral complications, may be induced by the disposition to disordered circulation, occasioned by the change in the state of nervous influence, and perhaps still more by the impeded return of blood from the brain during the paroxysms. — The vomiting so generally terminating the fit has been, as I have shown, imputed by many primarily to the stomach. But this symptom is often attendant upon severe fits of cough, whenever the epiglottis suffers unusual irritation. As it does not occur during the first days of the complaint, it seems to be owing to irritation of this part, which has been gradually coming on with the progress of the disease, until it reaches a pitch occasioning increased convulsive action of the respiratory muscles, extending to the diaphragm, the abdominal muscles, and stomach; the irritation of the morbidly sensible epiglottis by the cough increasing the paroxysm, until vomiting is produced.

36. II. **DIAGNOSIS.** — The existence of this complaint, particularly at an early stage, is not always readily ascertained. During the first period, it is not easily distinguished from a common cold. In most instances, however, the more paroxysmal nature of the cough, and the absence of fever, will indicate the affection, although the characteristic hoop is wanting. Occasionally this sign is absent altogether, in the slightest cases, although the disease is prevalent in a family; and yet there may be little doubt of the nature of the cough. Its more or less convulsive form, the perfect intervals, the evidence of congestion towards the head during the fit, and, as the complaint advances, the copious discharge of ropy mucus, are quite distinctive, although there is no complete hoop. When this latter sign is present, or when the paroxysms of cough terminate in vomiting, there can be no doubt as to the disease.

37. III. **PROGNOSIS.** — When the complaint is simple, the prognosis is favourable. But it may, at first, assume this form, and afterwards become complicated, and consequently more or less dangerous, owing to injudicious management, to various influences, and to its continuance; therefore a cautious or reserved opinion should be given as to the result in all the early stages. The complaint is, generally speaking, more dan-

gerous, the younger the child; but the period of dentition aggravates the risk. When, however, the infant has a healthy nurse, and is itself of a good constitution, — if it have not recently suffered from any infantile complaint, or been lately weaned — if the attack commences in summer or spring, or in a mild dry season — if the intervals be complete, and of considerable duration — and if the paroxysms be attended by vomiting and a free excretion of mucus, — a favourable prognosis may be entertained. If the lungs or the head — the latter especially — betray disorder, — if the child belong to consumptive, scrofulous, or old asthmatic parents — if there be tendency to cerebral diseases in the family, — a cautious or an unfavourable opinion should be given. All the symptoms indicative of the more serious complications (§ 10, 11.), are signs of danger. Upon the whole, the complaint is more favourable in adults than in infants, or even than in children; yet there is great risk, even in them, of the occurrence of pneumonia, bronchitis, or pleuritis; and, in young adults, of a scrofulous diathesis, of phthisis, or of hæmoptysis. It may cause abortion in pregnant females; and, in those who are hysterical, the cough may ultimately pass into an obstinate form of that complaint, and be removed with difficulty, especially if the circumstance be overlooked. The occurrence of the complaint during convalescence from measles or scarlatina is unfavourable, inasmuch as bronchitis and other pulmonary complications are apt to ensue. The presence of cerebral symptoms, or of fever, or a quick respiration in the intervals, and a scanty excretion of mucus after the fits, indicate danger.

38. IV. **CAUSES, &c.** — *Of the causes and modes of propagation of hooping-cough* we have no very positive knowledge. The disease occurs either epidemically or sporadically, and often during seasons, and under circumstances, wherein catarrhal and pulmonary affections prevail. When it commences in autumn or winter, it is always of longer duration than at other seasons; and, like other catarrhal complaints, it is often prevalent in spring and summer. It generally affects several or many at the same time; particularly infants from two or three weeks old and upwards, and children till after the second dentition. It sometimes occurs in adults, and but rarely in the aged. Among adults, females are oftener attacked than males; those of the latter who are nervous, irritable, or approach the nearest to the female constitution, being the most susceptible of it. It affects persons only once; but rare instances of second attacks have been observed.

39. Hooping-cough, independently of its epidemical appearance, seems to possess infectious properties, which, although admitted by the majority of authors, have been disputed by a few. It is always quickly propagated through a family, and its extension, when sporadic, may be prevented by removing the unaffected children. Mothers, nurses, and even fathers, who have not had the disease, will often contract it from their children; and I have known mothers, who had had it in their childhood, affected a second time by a child at the breast, or by its prevalence amongst the other children. Its infectious properties are further shown, by a child having caught it from others, at school or at nurse, and, when removed under the

disease to a distant part of the country, and into a family where it did not exist, communicating it readily to those who had not had it. Like all infectious maladies, it is much more rapidly propagated during certain constitutions of the air, particularly those in which catarrhal complaints are frequent, or when measles prevail, than in others. In its epidemic form, its infectious property appears to be most fully marked, from the circumstance, probably, of the concurring causes, whatever they are, being then more active, as well as from the predisposition these epidemic states occasion. Pertussis has also been frequently observed to follow, epidemically, upon epidemic morbilli. When it occurs sporadically, and during healthy states of the atmosphere, it often fails to be propagated, unless to those most predisposed. Moreover, it is often necessary to infection that the breath of the affected subject should be inspired by the unaffected; and that the disease should, at the time, be fully developed. The infectious property seems to diminish as the disease declines. Dr. CULLEN and many others believed that it disappeared in from four to six weeks; but, as Dr. ELLIOTSON remarks, the period cannot be fixed with any precision. It is generally from five to seven or nine days, or even longer, after exposure to infection, that the cough commences.

TREATMENT. — There are few maladies against which a greater array and variety of means, both medicinal and regimenal, have been recommended, than against hooping-cough. Vascular depletion, emetics, purgatives, diaphoretics, antispasmodics, excitants, internal and external irritants, &c., have been severally prescribed as unfailing agents, and combined, in infinite forms, in the treatment of this complaint. Although these may be extremely beneficial, they may be also most mischievous; success entirely depending upon their application appropriately to the peculiarities of individual cases. As the disease is variously modified and complicated, so it cannot be removed by a particular class of remedies; or by a specific form of treatment. Means inappropriately employed, may convert a simple and slight case into one both complicated and dangerous. — There are certain considerations requisite to a successful treatment of this complaint; and these should always be kept in view, not only in it, but also in all other epidemic maladies. I refer especially to the constitution and habit of body of the patient, to the character of the prevailing epidemic, to the nature of existing complications, and to the period and progress of the disease. It is owing to these circumstances, that the means which are beneficial in one case, or in one season, are often injurious in others. Thus the epidemics of spring or winter more frequently require vascular depletion, than those of summer and autumn, whilst these latter derive more benefit from emetics than the former. So important are the complications of pertussis, that the treatment should be mainly directed to their prevention or removal; and whatever they may be — whether bronchitis, pneumonia, congested or inflammation of the brain, &c. — it should be recollected that they are much more dangerous, than when occurring primarily or in a state of previous health, unattended by the aggravating circumstances of this complaint.

41. i. *Treatment of Simple Hooping-cough.* — In the slighter cases, little more is required than attention to diet, regimen, and the excretions, unless the child be plethoric, when additional means will be necessary. — a. In the first stage, a dose of *rhubarb with hydrarg. cum creta* or *calomel*, and a little *ipeacuanha*, may be given every night, occasionally interposing an emetic. The diet should be farinaceous, with milk. The child ought to be confined to a mild, equable temperature, and wear flannel next the skin, in winter, spring, or autumn. If the patient be plethoric, it will be proper, as a precaution, to apply *leeches*, according to his age, either behind the ears or over the sternum, as the head, or respiratory organs, may indicate a disposition to be affected. In the more severe attacks, also, this measure should never be neglected; and *diaphoretics*, with small doses of *antimony*, or of *ipeacuanha*, ought to be given every four or five hours; the secretions and excretions being duly promoted by *calomel* and *rhubarb* every night, and a *stomachic purgative*, or an emetic, each second or third morning, according to circumstances.

42. b. In the second stage of simple pertussis, an *anodyne* may be added to the diaphoretic mixture, and taken every four hours. If no sign of cerebral or pulmonary affection appear, the *hydrarg. cum creta* may be substituted for *calomel*, in the night-powder. It is in this period, that the treatment recommended by Dr. PEARSON is most serviceable. This consists of an *antimonial emetic*, followed by a draught containing a drop of tincture of *opium*, five drops of *ipeacuanha* wine, and two grains of *carbonate of soda*, for a child of one or two years of age. This draught is to be repeated every four or five hours for several days; the bowels being kept open by *rhubarb* and *calomel*. As the cough declines, he lessens the opiate, and gives *myrrh* in place of the *ipeacuanha* wine. This treatment is excellent for children of three or four years of age or upwards; but until they reach two or three years, opium ought not to be given. For those of the age mentioned by Dr. PEARSON, I consider the extract or syrup of *poppy*, or *coniun*, or *henbane*, to be preferable. The *liquor potassæ*, also, will be often advantageously substituted for the *soda*. The *decoctum senegæ*, or the *infusum valerianæ* may be given in this and the next stage with some aromatic water, and an antispasmodic. It will be sometimes of service, even in this stage, to exhibit an emetic, if the fits do not terminate in vomiting; and, unless the attack is slight, the same diet and regimen, as directed in the first stage, should be continued in this. A principal indication in both is to watch the first sign of visceral disease, and to oppose its accession by leeches applied in either of the situations just named, and by emetics. In both periods, also, advantage will accrue from the warm *semicupium* or *pediluvium* at bed-time; but, unless the case become severe, it will only be occasionally required. — The excretions should always be promoted by mild and stomachic purgatives.

43. c. In the third stage, the chief indications are to strengthen the system, and to supersede the convulsive character of the affection, by giving tonics with antispasmodics and anodynes. The gentler tonics may be first employed, and successively those which are more energetic, in conjunction with preparations of *poppy*, or with

paregoric, or with *conium*, *hyoscyamus*, *laurel water*, &c. There are numerous medicines belonging to these classes that may be given with great advantage in this stage, but they will be noticed hereafter.—*Tonics*, as well as antispasmodics or anodynes, will be advantageously exhibited with the *alkaline subcarbonates*, or with *liquor potasse*, or BRANDISH'S alkaline solution; and *purgatives* beneficially conjoined with vegetable bitters or other tonics. If the disease assume a period of or intermittent type, the preparations of *bark* or *quinine* should be prescribed.—It is principally in this stage, that *change of air* proves so serviceable. It should not be neglected, particularly when this period and convalescence are protracted. In both this and the preceding stage, *embrocations* or *liniments* of a rubefacient and antispasmodic kind (see *Append. F. 295, et seq.*), applied to, or rubbed upon, the spine, will prove very serviceable.—*Sinapisms* will also sometimes be of use, especially in threatened bronchitis; and, in young, delicate, or irritable children, are preferable to blisters and the tartarised antimonial ointment, from which I have seen dangerous consequences accrue in patients of this description.

44. ii. *Complicated Hooping-cough*.—A. The most common complication is with *inflammation of the bronchial mucous membrane*. But this may not be the only associated inflammation; for *pneumonia*, or *pleuritis*, or even both, may be superadded to it,—a contingency to which the practitioner should be always alive. If *simple bronchitis* (§ 6.) be alone present, *local depletions*, in addition to the treatment already directed, must be prescribed; and *antimonial wine*, with the solution of the acetate of ammonia and camphor julap, should be taken every third or fourth hour. In young children, however, *ipecacuanha wine* should be preferred to antimony. A small dose of calomel, with or without *ipecacuanha*, *rhubarb*, or *jalap*, may be given every night, or night and morning, according to circumstances; guarding, however, against too great an action on the bowels. After depletions have been sufficiently employed, *sinapisms* or *blisters* applied for a few hours, or until erubescence of the surface is produced, and then followed by warm poultices, will be very serviceable. The warm *semicupium* may also be resorted to at bed-time. An *ipecacuanha emetic*, when expectoration is difficult, or twice or thrice a week, will also be beneficial. After the inflammatory symptoms are removed, any of the *anodynes* recommended above may be added to the diaphoretic mixture, an embrocation or liniment (*F. 297. 300. 311.*) applied along the spine, and the complaint treated, in the *second and third stages* especially, as advised for the simple disease.

45. B. In the complication with *pneumonia* or *pleuritis*, or with both (§ 14—18.), more decided depletion will generally be requisite, than in the bronchitic form. But it must not be overlooked, that these inflammations are seldom present in pertussis without more or less bronchitis. In this, as in the other pulmonic complications, *cupping* over the sternum, or between the shoulders, is a preferable mode of depletion to the application of leeches; and, in a far advanced stage of these inflammations, either after blood has been freely abstracted, or when excessive secretion into, or accumulation of viscid fluid in, the bronchi threatens suffocation, *dry cupping* between the

shoulders is the next efficient means to a stimulating emetic. A purplish hue of the lips or cheeks, and dilatations of the nostrils, should not prevent depletion, if it is otherwise indicated, particularly in plethoric children, if it have not already been practised, and if the skin be hot and the pulse not much reduced in strength. When the substance of the lungs, or pleura, becomes inflamed, *calomel*, with or without *ipecacuanha*, should be given in larger and more frequent doses, than when the bronchi only are implicated, and the diaphoretic mixture should contain an antimonial preparation. This last, however, ought to be given with caution in infants or young children, for I have seen most serious effects produced in them by large doses of tartarised antimony, particularly when too often exhibited, or too long persisted in. In this complication, *sinapisms* and *blisters* prescribed as above (§ 16.) are beneficial after vascular depletion has been pushed sufficiently far; but, in many cases, much greater benefit will accrue from the application of the warm turpentine *epithem* on the chest, or between the shoulders, or from one of the *liniments* (*F. 297. 300. 311.*) already noticed, employed in the form of an embrocation.—Having removed the existing complication, the subsequent treatment must entirely depend upon the peculiarities of the case. The diet and regimen should be strictly enforced, and the patient kept in a tolerably equable temperature. The *semicupium*, or bath, gentle *diaphoretics* with *diuretics* and *anodynes*, and, as the disease declines, mild *tonics* with *sedatives* and *antispasmodics*, will also be great service. The excretions should be free, and change of air advised as soon as it can be safely attempted.

46. C. The complication with *cerebral affection* must be promptly met by the application of leeches behind the ears or to the occiput, or by *cupping* in this situation or on the nape, according to the age of the patient and the severity of the complication. Whenever the simple form of pertussis has presented such severity as to render the occurrence of pulmonic or cerebral affection at all probable, and more especially if the child have been plethoric, I have always directed leeches to be applied behind the ears or to the occiput, influenced by the views as to the pathology of the complaint already stated; and I have had the greatest reason to strongly recommend this practice. When hooping-cough is aggravated by teething, the cerebral complication should be dreaded, although neither *convulsions*, nor any other very prominent symptom of it, may have appeared. In these cases, the gums ought to be attentively examined, and scarified as they may require it. If the infant be at the breast, the nurse's milk and health should receive attention. The secretions and excretions of the patient must be most actively promoted by full doses of *calomel* with *James's powder*, by *purgatives*, and *cathartic enemata*. The temperature of the head should be reduced by the cold affusion on it, or by cold-sponging whenever either becomes necessary, and the means advised for *Inflammations of the Brain* (§ 191.), and for *Acute Hydrocephalus* (see *Dropsy of the Head*, § 260.), ought to be employed according to the circumstances insisted upon at these places. The objects are to remove incipient mischief, and to

prevent thereby the accession of a formidable malady, by a prompt application of efficient means. To wait until the coming evil has fully declared itself, is to sacrifice the principal chances of success; for all cerebral affections that supervene during pertussis are much more dangerous than those which occur primarily. As soon as the complicated affection is removed, change of air should be recommended. Nothing is so advantageous as a complete change of air for children treated in London, or in other large towns.

47. *D. Infantile remittent fever* generally does not appear in connection with pertussis until an advanced stage of the latter. 'Other associated affections, as *chronic pulmonary disease, curvatures of the spine, rickets, affections of the joints, enlargement of the mesenteric or of the absorbent glands, &c.*, are sometimes also met with in protracted cases of hooping-cough, or in the stage of decline, particularly when the disease has been neglected, or when the morbid affection has been perpetuated by habit, or by the neglect of such means as are calculated to break the chain of disordered action. They often also may be traced to constitutional vice or predisposition, and to neglect of the excreting functions. Under whatever circumstance, either these or the remittent fever may occur in the advanced course of hooping-cough, they are principal elements of the complicated malady. The functions of digestion and respiration, and consequently assimilation and nutrition, having been more or less impaired during the early stage of the primary disease, inherent vice, or an existing disposition to disorder, the more readily manifests itself. As constitutional power sinks, maladies, which most commonly arise from debility, make their appearance; the particular malady being determined in its occurrence by hereditary taint, or by previous disorder. In many cases, the superinduced affection is merely a sequela of pertussis; but in others, the characteristic symptoms of the primary disorder still continue in a very pertinacious manner.

48. The remittent febrile disorder depends, in several instances, upon chronic irritation of the digestive mucous surface; in others, upon the state of the season or weather, and the influence of exhalations from a humid soil, or upon a moist and cold atmosphere; and in some, upon both conjoined. But whatever may be the source, it cannot be doubted, that debility is an important part of the disorder, and that the alvine secretions and excretions are much disordered. At the same time, therefore, that a treatment appropriate to the affection of the digestive canal is requisite, the state of constitutional power must receive attention. *Purgatives* are generally necessary in this complication, especially at an early period of it; but they ought to be of a stomachic kind, or combined with *tonics*, and neither be too irritating, nor too pertinaciously directed. The compound infusions of gentian and of senna, with sulphate of potash; rhubarb with this latter, in an aromatic water; hydrargyrum cum creta, or blue pill, with ipecacuanha, at bedtime—either of the preceding, or castor oil, being taken in the morning; are amongst the most suitable purgatives; and they should be repeated according to the state of the stools. If the bowels be irritable, or dysenteric, a full dose of calomel or hydrarg. cum creta, with the compound ipeca-

uanha powder, should be first given, having in some cases premised an ipecacuanha emetic. Some hours afterwards, a dose of castor oil ought to be taken, and its operation promoted by an emollient injection. After the intestinal canal is evacuated, irritation should be allayed by mild tonics, conjoined with aromatics, absorbents, sedatives, or antispasmodics, according to the peculiarities of the case. Preparations of cinchona, quinine, chalybeates, &c. will subsequently be of service. The decoction of bark, or any tonic infusion, will be advantageously given with liquor potassæ, or BRANDISH's alkaline solution; and afterwards the ammonio-chloride or potassio-tartrate of iron, and change of air, will generally prove most beneficial.

49. Although this treatment is recommended, chiefly with the view of preventing hooping-cough from lapsing into, or becoming associated with, infantile remittent, and of removing this complication, yet it will be equally serviceable in the prevention of the other *sequela* of the complaint mentioned above (§ 47.). When *affections of the joints, rickets, or mesenteric disorder* either supervene upon, or follow, an advanced stage of pertussis, the preparations of *iodine*, and other means directed for these complaints, should be resorted to. *Affections of the spine* are generally owing to weakness of the muscles and ligaments of the vertebral column, induced by this disease; or to scrofulous inflammation of some portion of the column itself. When the disorder is attributable chiefly to the former of these causes, then the *tonics* already recommended, *salt water bathing, sea air, and frictions* with stimulating liniments along the spine, will be very serviceable; and when the more solid structure of the column is implicated, then the preparations of iodine, BRANDISH's alkaline solution, or the *liquor potassæ*, and change of air, should be severally prescribed, as circumstances will suggest.

50. iii. *Of the more Specific Modes of Treatment advised for Hooping-Cough, and the Circumstances in which they are admissible or appropriate.*—WILLIS and SYDENHAM directed *bloodletting* in the phlebotoric and inflammatory cases, *emetics* of the oxymel of squills, *purgatives*, and *blisters* to the nape of the neck or between the shoulders. WILLIS also prescribed *tonics* during the decline of the complaint. He particularly notices the *Muscus pyxidatus*, or *M. Pyxidoides*, the *Lichen pyxidatus* of TOURNEFORT, or cup-moss, as a very popular remedy in hooping-cough. GERARDE remarks that "the powder of this moss, given for certain daies together, is a most certaine remedy for that perillous malady the chin-cough." DILENIUS praised the powder of it, when frequently given; and supported his opinion by the authority of WILLIS and GERARDE. Other writers have prescribed it in the form of decoction in milk. VAN WOENSEL (*Hist. de la Soc. Roy. de la Méd.* t. ii. p. 294.) recommended it in decoction, sweetened with syrup of mint. BAGLIVI employed also the *Muscus arboreus* and *M. quereus* in pertussis, in the form of decoction; and a syrup prepared from the decoction exists in the *Pharmacopœia Wittenbergensis*, to facilitate its exhibition to children. STOLL (*Rat. Med.* vol. vi. p. 6.) found these mosses or lichens, particularly that growing on the oak, very serviceable in the hooping-cough which was epidemic in Vienna in the spring of 1775; FRANK also praises it.

51. DE HAEN, in a letter written in 1747 to VAN SWIETEN, describes a very prevalent and fatal epidemic hooping-cough. Children from a few weeks to ten years of age were chiefly affected, but adults were occasionally also seized. When one child was attacked in a family, not escaped who had not had the disease previously. It was often protracted to three, four, or even six months. He states that vascular depletion in the plethoric, purgatives, ipecacuanha, anodyne emulsions, opiates, oxymel of squills, nitre, &c. were severally employed, but with no marked success. He subsequently, with his colleagues, OUWENS, WESTERHOFF, and VELSEN, was induced to prescribe the *Kermes mineral*, by the benefit derived from it in spasmodic asthma. To a child of six months, he commenced with one grain in the 24 hours, given in sugar and divided into three powders,—to a child of one year, two grains, in the same period,—and to a child of three years, three grains, increasing the dose gradually and cautiously. The success of this medicine he describes as most astonishing. In another letter similarly addressed, in 1751, DE HAEN remarks that, although he had found the *Kermes mineral* of very great service in the hooping-cough of that autumn, it was less so than in the epidemic of 1747: and he adds—"Pleque vero curantur *Limacum** lacte coctum largo atque protracto usu." (A. DE HAEN, *Opusc. quæd. inedita*, &c. Cur. J. EYERET, P. i. Vind. 1795, p. 42, 173.) In another work (*Rot. Med. t. iv. p. 121.*) he notices a case in which the fit of cough terminated in suffocation: but the means usually resorted to in suspended animation having been employed, restoration and recovery took place.

52. STOLL states that he never saw sporadic cases of pertussis in Vienna up to the year 1777. The disease had previously appeared only in epidemic forms, and generally with modified characters. At some seasons the stomach, at others the head, and sometimes the lungs, were especially deranged. Occasionally it was attended by a miliary, and in some instances by a scarlet eruption. In a few cases urticaria and erysipelas occurred. In Vienna and Hungary, it generally evinced a stomachic origin.—The epidemic of 1775 frequently affected adults. The paroxysms were most severe on alternate days, and during the night; and peripneumonia was a frequent complication. He states, that bloodletting, emetics, purgatives, emollients, and opiates, especially this last, were prescribed without benefit. Blistering, however, between the shoulders, and bleeding, were beneficial when the disease was about to pass into pneumonia. He observed the injurious effects of stimulating expectorants in favouring the development of pneumonia, with which pertussis is so apt to become complicated.—Tonics were generally required, as early as debility became apparent; and, even after the disease was removed, they were often necessary. When the bowels were not freely open, they were conjoined

with aperients.—In the epidemic of 1779, all the cases in which the fits terminated in vomiting recovered. STOLL found ammonia, gum ammoniacum, and Venetian soap, given in simple oxymel, or oxymel of squills, of service. Decoctions of emollient herbs and roots, and of the flowers of arnica, were also beneficial. Opiates were productive of mischief in many cases, and even of fatal effects in some, a glutinous effusion having been found in the bronchi of such cases.—During the epidemic in Copenhagen in 1784, BANO made trial of the *cicuta*, after the exhibition of emetics; but with temporary advantage only. Towards the decline of the disease, musk was found of service.

53. Dr. HUXHAM introduced the use of *mercurial purges*. After their operation he prescribed the *Pe bark*. Dr. BISSET commenced the treatment with an emetic of oxymel of squills, followed by rhubarb, manna, &c. As soon as the severity of the complaint began to subside, and the intervals between the fits to be prolonged, he gave the bark.—The propriety of having recourse to emetics was advocated by HOFFMANN, FORBES, AASKOW, NAVIER, AMSTEIN, HUFFELAND, and others. The substances usually employed as emetics were ipecacuan, tartar emetic, *Kermes mineral*, and oxymel of squills. They were generally exhibited at the commencement of the treatment, and occasionally in the course of the complaint. STOLL and REMER gave them only at the commencement. Ipecacuanha was preferred by LINNÆUS, AASKOW, THULENIUS, WEBER, and many others, and oxymel of squills by MELZER.—STOLL considered emetics to be especially serviceable in the hooping-cough during summer or autumn. STOLLE directed them in the evening; and SIMS, after bloodletting.—LINTHOM believed them to be useless, and JONES and NIEMANN to be absolutely injurious. BURTON was amongst the first to condemn them, and he no less objected to bloodletting and cathartics, unless in inflammatory cases. In their stead he prescribed a mixture, the most active ingredient of which was tincture of cantharides. There can be little doubt of emetics having been occasionally abused by inappropriate exhibition; but experience has proved them to be most serviceable in this complaint, when judiciously employed.—At the present day, the means advised by BORSIERI are the most generally applicable, and therefore the best, as far as it goes, that can be adopted. He prescribed a smaller or larger emission of blood early in the disease; a gentle emetic, occasionally repeated, where there is no symptom forbidding it; aperients of calomel, rhubarb, or manna, and external irritants. The only fault that can be found with this treatment, is the neglect of demulcents, anodynes, and antispasmodics, which are very generally beneficial in an advanced stage of the complaint.

54. Dr. DARWIN insisted upon the frequent recurrence of peripneumonia during hooping-cough; and he therefore directed leeches, to prevent, as well as to remove, this complication. After evacuating the bowels, and giving diluents, and when the complaint had reached the second stage, he prescribed, for a child of about three years, a sixth of a grain of calomel, a sixth of a grain of opium, and two grains of rhubarb, twice a day. The only objection to his treatment is the too general use of opium

* Appended to a case treated by STOLL, the history of which is given by EYERET (*Op. cit. t. ii. p. 184.*) is the following note:—Decoctum *Hamacum*, in epidemica tussil convulsiva egregium et unicum sæpe fuit remedium, teste HÆNTO, qui a femina rustica Hagæ Batavorum id didicit. Adfuerit aliæ epidemice ubi nil iuvit, sed ubi *Kermes mineralis* et opium omnem absolvit paginam.—Decoctum hoc limacum per octo dies repetatur.

and the amount of the dose of it, for a child: in combination, however, with calomel, it is much less injurious than when given alone. He likewise employed antimonial emetics, mild cathartics, cool air, repeated blisters, or the tincture of cantharides internally, warm bathing, the inhalation of the steam of warm water containing a little vinegar, opiates in small doses, and digitalis. He prescribed digitalis, whenever a tendency to inflammation, or to effusion, or to pulmonary consumption appeared. He considered, with much justice, *diuretics* to be more or less useful in this, as in other disorders implicating the respiratory organs. Dr. ELLIOTSON has very properly contended, that, wherever there is oppression of breathing, with violent spasmodic attacks of cough, accelerated pulse, and sonorous or crepitous rattle, inflammation of the respiratory organs is present, and should be treated by bleeding, by emetics, and by calomel. In such cases, sedatives and antispasmodics ought not to be resorted to, until inflammatory action is removed, and the secretions and excretions are freely evacuated.—It is unnecessary to allude further to the various modifications of treatment adopted by other experienced physicians. I shall, therefore, only notice some of the principal remedies prescribed for this complaint.

55. *iv. a. Bloodletting* was directed early in hooping-cough, by the great majority of writers, from the times of SYDENHAM to the present day; frequently even in slight and simple cases, as a precautionary measure, particularly in plethoric habits. LITTLE has justly remarked, that, if it is not resorted to early in the complaint, it is of little service at an advanced period; but cases in which inflammatory affections of the lungs or brain arise at this period, furnish exceptions to this rule. STOLL prescribed depletion chiefly when the lungs became affected. HUFELAND directed *leeches* to the chest; and WEBSTER, to the temples, in most cases. I have seldom omitted to apply them behind the ears, or between the nape and occiput, or to prescribe *cupping* in this situation, at an early stage, influenced by the reasons stated above (§35.).—Of *emetics*, mention has already been made (41. 44.).—*Purgatives* have been employed chiefly with the view of evacuating accumulations of feces, and of promoting the secretions and excretions. *Calomel* has been very generally recommended, both as an aperient and as an alterative. FISCHER and HARGENS gave it alone; but it has been more generally conjoined with rhubarb or some other purgative; and, in the inflammatory complications, with James's powder, ipecacuanha, &c. DARWIN and STROEM prescribed it with rhubarb and opium; in which combination it is often beneficial at an advanced stage, and in patients above four or five years of age. The frequent use of *laxatives* or mild purgatives has been much insisted upon by MICHAELIS and KORTUM.—*Cathartic or irritating enemata* have been resorted to by HOLDEFREUND and HUFELAND.

56. *b. Diaphoretics and expectorants* have been generally employed through the course of the complaint; the former at the earlier, the latter at more advanced, periods. Some of these medicines promote both perspiration and expectoration, and are hence the more serviceable in severe or complicated states of the complaint.—*Antimonials*, in small doses, were praised by FOTHER-

GILL, WEBER, and many others. The solution of tartar emetic was employed by HIRSCHL; the golden sulphuret of antimony was preferred by CLOSIUS and HANNES. VAN DE SANDE and UNZER gave it after having premised emetics, and HOLDEFREUND conjoined it with sugar of milk.—The *Kermes mineral* was prescribed by DE HAEN, HARGENS, KORTUM, HINZE, and STYX. QUARIN gave it with the flour of sulphur, gum-arabic, and extract of liquorice; but, although formerly in great repute in febrile and pulmonary diseases, it is now seldom employed. The following powder was once much used on the Continent for the cure of this complaint:—

No. 257. R Kermes Mineralis, Pulv. Ipecacuanhae, ʒi gr. j.; Ocul. Cancror. pulv. et Pulv. Aëcie ʒi ʒj. Tere bene, et divide in Cartulas vj., quarum capiat unam sextis horis.

57. This dose was prescribed for a child of one or two years. Much of the virtues of these powders was clearly attributable to the *ipecacuanha*, which is one of the most serviceable medicines employed for hooping-cough.—HENNING and KEUTSCH relied chiefly upon it, and gave it in minute and frequent doses. HARGENS ordered it in considerable quantities; KREBS, in the form of infusion; VOGLER, with opium, magnesia, gum arabic, and sugar; and PEARSON, with opium and soda.—*Ammoniacum* and *squills* have been used as expectorants; but they require much caution, for, in the more inflammatory states of the complaint, they may aggravate the disorder, or even favour the occurrence of inflammatory action, in plethoric habits, or when the phlogistic diathesis is present. The *oxymel of squills* was frequently employed as an emetic, and often with benefit. HUFELAND and SULZER gave it with cinchona and extract of hyoscyamus, in the advanced stages of the complaint.

58. *c. Numerous antispasmodics* have been prescribed in the second and third stages, on account of the convulsive character of the affection.—*Assafœtida* was recommended by MILLAR; but was considered useless by HUFELAND. Castor was given by MORRIS and HORN; musk, by CONRAD, GESNER, WOLFF, VON BERGER, HUFELAND, and HORN. MARCUS conjoined musk with the sulphuret of antimony and magnesia. The *oxide of zinc* was praised by CRELL, PERCIVAL, and HART. SCHEIDEMANTEL very judiciously employed it after evacuations. WINCKLER and TODE gave it with cinchona; and STARRKE, with cream of tartar; but, from this combination, tartrate of zinc must have been formed. HARGENS, however, considered it inefficacious. I have but little experience of its effects in this complaint. *Camphor*, in very small doses, with diaphoretics, at an early period; and in larger quantities, with anodynes, other antispasmodics, or tonics, is often of great service, particularly after moderate depletion and alvine evacuations. The *subcarbonates of the alkalies* were given by HINZE, MEMMINGER, PEARSON, and KEUTSCH, and are often important adjuvants, in conjunction with hyoscyamus or other narcotics, and with rhubarb or other aperients, in the treatment of the second and third stages. I have, however, often preferred the *liquor potassæ* or Brandish's alkaline solution; especially in the scrofulous diathesis, and in cachectic habits. The *subcarbonate of ammonia*, in small doses, and other preparations of ammonia,

are frequently beneficial in cases of debility at an advanced period, or when the complaint is protracted. *Muriate of ammonia* was recommended by STOLÉ, at an early stage, with *oxymel*. I have found it an excellent refrigerant antispasmodic and tonic, in several instances.

59. *d.* The most energetic *narcotics* and *anodynes* have been prescribed, with a view of allaying spasmodic action, and generally in conjunction with some one of the antispasmodics or diaphoretics already noticed. *Opiates* were given by DE HAEN, with camphor and musk; by HUFELAND, in the form of DOVER'S powder; by JACOB, with pectoral elixirs and spirits of nitric æther; by RÜLING, similarly combined, after four or five emetics; and by LEPASSE and LETTSOM, in the second and third stages, with cinchona. WILLAN employed a watery extract of opium; and BIERA used it externally in frictions or in liniments. Of the various preparations and combinations of opium, the paregoric elixir is indisputably the best in whooping-cough, especially when given with an alkaline subcarbonate, in almond or mucilaginous emulsions. The extract of the *lactuca virosa* was praised for this complaint by DR. GUMPRECHT and others; and it has been much employed by some practitioners. *Conium* was first prescribed for whooping-cough by DR. STORCK and DR. BUTTER. It was afterwards used by RANÖ, SCHNEIDER, and HUFELAND. — LETTSOM and HARGENS considered it devoid of efficacy. I have prescribed it in numerous cases, and believe it beneficial when its virtues are not injured by preparation or age. It should not be given in the first stage. — *Hyoscyamus* was recommended by WOLFF, WIGAND, and JOERDENS; and by FISCHER, with vegetable bitters. It is nearly as beneficial as *conium*; but, in some patients, it is more liable to affect the head.

60. *Belladonna* has been extensively tried by Continental physicians in pertussis, and the powder of its root was most commonly employed; particularly by RANÖ, BUCHHAAR, FRANK, MEGLIN, and ETTMÜLLER; and by LAENNEC after the operation of emetics. SCHAEFFER and WIDEMANN gave it in large doses, and considered that it was quite a specific, particularly when administered in enemata. This is, however, a somewhat dangerous mode of prescribing it. The minute doses, recommended by WEZLER and HUFELAND, are much more judicious. — The extract of *tobacco* has likewise been prescribed by GESNER, THILLENUS, and HUFELAND; but it also requires much caution, and ought not to be tried with young children. The tincture of *Lobelia inflata* has been employed by DR. ANDREWS, with benefit. When the convulsive cough is aggravated by the accumulation of viscid mucus in the bronchi, the exhibition of this medicine, until it produces vomiting, will be of great service. *Colchicum* was praised by HADEN and ALCOCK; and, when cautiously given in conjunction with magnesia, or the alkaline carbonates, or with either of the antispasmodics noticed above (§ 58.) it is of service in the inflammatory complications; but it may be very injurious in other circumstances, and particularly in very young patients. The same remarks apply to *digitalis*, as prescribed by DRAKE and DARWIN. *Hydrocyanic acid* has also been recommended by DR. GRANVILLE and DR. ELLIOTSON. I have seen much benefit derived from it, in the advanced stages of the complaint,

particularly when given in conjunction with camphor, or with gentle tonics or demulcents. It should be most cautiously tried, if tried at all, with young children. DR. ELLIOTSON, however, remarks, that a minim may be added to an ounce or two of almond emulsion, and a teaspoonful of this given them three or four times a day. *Laurel water* was much employed in whooping-cough by Continental physicians, and is still preferred by many to prussic acid.

61. *e.* Amongst *stimulants*, the tincture of *cantharides* has been most frequently employed. It was praised by FORBES, SCHAEFFER, and PLOUQUET; and was prescribed with camphor and extract of bark, by BURTON; with antispasmodics and anodynes, by WOLFF, WIDEMANN, and HUFELAND; with preparations of cinchona, by CHALMERS; and with these and paregoric, by LETTSOM and GRAVES. I have prescribed it in a number of cases, and have found it diminish the frequency and severity of the fits, in the nervous states of the complaint, particularly when it occasioned irritation of the urinary organs. The extract of *nux vomica* was recommended by MICHAËLIS and HUFELAND, conjoined with the extract of *Carduus benedictus*. I have tried it with manifest advantage, in circumstances similar to those in which cantharides was employed. But neither the one nor the other ought to be resorted to in the first stage, or in the inflammatory complications. *Guaiac* was prescribed for pertussis, chiefly by HUFELAND and VELZIGANS; and saffron with castor, or evacuations, by THEUSSINK and HARGENS. *Castor* was itself much employed by SAUVAGES, MORRIS, and HORN; and a decoction of unroasted *Ilex* was given by HUFELAND. The *muriate of argyle* has also been noticed with commendation, by the writers just named.

62. *f.* The propriety of having recourse to *tonics* in the second and third stages, particularly the latter, cannot be disputed; but they ought not to be prematurely prescribed, especially in the second stage, and whilst a phlogistic diathesis is present even in the slightest degree. Of the various tonics, the preparations of *cinchona* are certainly the best. The infusion may be first given, conjoined with the solution of the acetate of ammonia, and subsequently the decoction with liquor potassæ or the subcarbonate of soda. The extract of *conium* or *hyoscyamus*, or paregoric elixir, may be added to either of these. *Bark* was strongly recommended by QUARIN, COURBETTE, and HOLDEFREUND. HANNES gave it with the sulphuret of antimony, and administered it in enemata; and SAUVAGES and MORRIS, with castor; BISSET, STOLL, AASKOW, WYBER, and MICHAËLIS, very judiciously premised sanguineous depletions, emetics, and purgatives, before they ventured upon it. MURRAY and HUFELAND gave it with cantharides in the latter stages. It is much more beneficial in some epidemics than in others. When the complaint is protracted, and assumes an intermittent or periodic type, particularly a tertian form, quinine, or cinchona ought never to be omitted. — The *arsenical solution* has also been employed in circumstances requiring the bark. It was much recommended by FARRAR and SIMMONS, and is undoubtedly of service in these; but it is not superior to cinchona; and in children, especially, it is a much more hazardous substance. — I have given the *sulphate of*

sino with great benefit in some cases; and the nitrate of silver, triturated with extract of hop or of hyoscyamus, with equal advantage in others. The sulphate of iron was very favourably noticed by Dr. STANOE, and is an excellent medicine in the third stage, or purely nervous state of the complaint; but it is not superior to the other preparations of iron, particularly the ammonio-chloride, and the potassio-tartrate.

63. g. There are various other medicines which have been employed internally against hooping-cough; but these require only a simple enumeration. Of the *Lichen pyridatus*, mention has already been made (§50.) The *Lichen cocciferus* was recommended by FORBES and VON WOENZEL; and the *L. Islandicus* by WEBER. The *Ledum palustre*, *Tilia Europaea*, and *althæa officinalis* were prescribed by WAHLBOM, LINNÆUS, WALTER, and WATLIN; the *Gewa urbantum*, by KECK and BUCHHAARE; *Phellandrium aquaticum*, by VAN DER BOSCH; an infusion or extract of the *Narcissus pseudonarcissus*, by DUFRESNOY; an extract of the *Mesembryanthemum*, by WENDT; and an extract of the *Cardamine pratensis*, by COMHAIRE and VEILLECHÉZK. Isinglass was used in this complaint, by HEINEKEN and GAUTIER; acetate of lead, in small doses, by FORBES; oxide of zinc, with cicuta or belladonna, by GUERSENT; acetic acid, with sugar, by HANNES; sulphate of ENHAM, QUARIN, and UNZER; and sulphuret of potass, by several Continental physicians.

64. h. There are few complaints in which external medication has been so extensively or so beneficially employed, as in this. Although the inhalation of simple or medicated watery vapours does not strictly come under this head, I may here state, that it has been advised by PEARSON, DARWIN, and others. The observations as to this practice, in the article on *Inflammations of the Bronchi* (see that article), and as to the medicines that may used in this manner, entirely apply to hooping-cough. In the early stage, the vapour to be inhaled should be either simple or merely emollient. In the latter stages it may be slightlyregnated with camphor, or with some narcotic; but this practice can seldom be adopted for young children. The inhalation, in early or inflammatory states of the complaint, of stimulating vapours, is always injurious.

65. i. External irritants of various kinds have been prescribed. Blisters were applied to the chest, and between the shoulders, by DE MEZA, PALDAMUS, QUARIN, and others; but the precautions stated above (§ 44.) should be observed, particularly in cases of infants and young children. KNEREL directed rubefacients to the nape of the neck; PELAROUS and HUFFLAND, to the lower extremities; HENNING and HECKER, to the epigastrium; and DURR, to the soles of the feet. Various substances have been employed as external irritants. HENNING recommended a cataplasm containing scraped *horserradish*; STRUVE, a liniment with tincture of *cantharides* and *tartar emetic*; and ZADDO, the tincture of *ginger* applied to the epigastrium. AUTENRIETH prescribed an ointment containing tartar emetic to be rubbed upon the chest, or between the shoulders, or upon the epigastrium; and this practice was adopted by KELCH, MENNEM, NOLDE, and MICHAËLS; but HORN and SCHNEIDER found it productive of

little or no benefit. AUTENRIETH has received the credit of being the first to employ tartar emetic as an external irritant; but it was thus recommended long previously, by the older MONRO. I have seen the incautious use of this ointment productive of dangerous, and even of fatal sloughing, in debilitated or cachectic children and infants. LOEBENSTEIN-LOEBEL advised a liniment containing a solution of *phosphorus* in oil of cummin and camphor to be applied on the epigastriac region. From an extensive experience of external irritants in the treatment of pertussis, I prefer the *semicupium* or *pediluvium*, mustard and salt having been put into the water; the occasional application of a mustard poultice to the chest or epigastrium; dry cupping on the nape of the neck or between the shoulders; or friction with the following liniment along the spine, or the application of a piece of flannel moistened with it, on the sternum or epigastriac region, according to the peculiarities and complications of the case:—

No. 258. R. Linimenti Camphoræ Comp., Linimenti Terebinthinæ, aa 3 i.; Tinct. Capsici 3 j.; Olei Cajuputi 3 ss. vel 3 j. Misce. Fiat Linimentum, vel Embricator.

66. Since the introduction of vaccination, it has been proposed by OKES, CLEEVE, and MOUTAIN, to inoculate with the vaccine matter as a preventive and as a cure of hooping-cough. This subject has been recently agitated, but without any conclusive evidence of benefit having been derived from the practice.

67. k. In the second, but especially in the third, stage of the disease, change of air, particularly to the sea-side, as recommended by GREGORY and HUFFLAND, and sea-bathing, are of the utmost advantage. For patients residing on the sea-coast, frequent excursions on the water will be highly beneficial, especially if nausea or vomiting be thereby produced. Salt-water bathing, commencing with the warm or tepid bath, and passing gradually to the cold bath or shower bath, will be found very serviceable, if no complication forbid it. The diet of the patient, in the first stage, should be antiphlogistic; and in the second and third it ought to be very light, chiefly farinaceous, and moderate in quantity. Over-distention of the stomach aggravates the fits, and favours cerebral congestions. Exposure to cold, or to vicissitudes of weather or temperature, running, &c., also, may induce inflammatory complications. Young children ought to be carefully watched at night, and be raised up as soon as the fit is threatened. Whenever the phlegm obstructs the fauces, it should be removed by a small thin piece of whalebone, bent in the form of a tongue-scraper, or by the finger of the nurse.

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HYDATID. — Syn. *Hydatis* (idaric, a vesicle, from ὕδωρ, water). *Acephalocystis*, *Acephalocyste* (from α, privative, κεφαλή, the head, and κύστις, a vesicle — a vesicle without a head), *Laenneo*. *Vessie sans adhérence*, *Cruevillier*. *Echino*.

ovococcus Hominis, Rudolphi and Bremser. *Polycephalus humanus*, P. *Echinococcus*, Zeder. *L'Echinococque de l'Homme*, Lamarck. *Fischiosoma*, Brera. *Hydatide*, Fr. *Wasserblase*, *Blasenwürm*, Germ. *Idatide*, Ital.

CLASSIF. — I. CLASS, V. ORDER (Author, in Preface).

1. DEFIN. — *Unattached vesicles, possessing a proper vitality, but dependent upon the parent body for the situations and conditions of existence.*

2. The term *Hydatid* has been very loosely employed by most writers, and even by many of the present day. It has been used by some as a generic appellation, not only for the several species of vesicular worms, or vesicles with one or more distinct heads, but also for the vesicular bodies now under consideration; and by others the name has been very improperly extended to those simple cysts which are produced from, and connected with, the surrounding tissues. In this article I shall consider only those vesicular bodies which do not possess distinct heads, but which present signs of a proper vitality, as constituting *true hydatids*; and shall refer the species, *Cystosarcus*, *Polycephalus*, and *Ditrachyrceros*, arranged by CLOQUET, KERN, and others, under this head, to that of *vesicular worms*. As to the species *Echinococcus*, described by RUDOLPHI, ZEDER, & others, I believe it, with BRERA and BREMSE, to be merely a variety of the *acephalocystis*. Simple cysts, or pseudo-hydatids, are altogether distinct formations from those under consideration; but I shall also briefly notice them. (See PARASITIC DISEASE, § 113—115.)

3. The name *Acephalocyste* was applied by LAENNEC to an organic production, consisting of vesicles or spheroidal globules contained in a distinct cyst, which isolates them from the surrounding tissues, and with which they have no kind of connection. Although these productions scarcely merit to be elevated to the rank of a distinct species in animal existence, yet they must be considered, in pathology, to possess an individual vitality. They thus form one of the several species of *parasites*, to which the human frame often furnishes origin and nutrition, and which not infrequently destroy the parent body. (See PARASITIC PRODUCTIONS.) When it is considered that they present nearly the same form and appearance, that they are unconnected with the surrounding tissues, differing only as to size; originating, without any determined cause, in the very substance of our organs; developing and multiplying themselves; and manifesting their existence only by the compression of adjoining structures, whence often result the most serious effects, and even death itself; it must be admitted that they deserve a due share of attention.

4. *Hydatids* were probably known to the ancients, although imperfectly; as HIPPOCRATES, CELSUS, GALEN, and ARRETEUS mention the existence of cysts in many of the states of disease in which they are met with in the present day; but no precise description of them was given until 1685, when HARTMANN directed attention to their animalcular nature. In 1691, Dr. TYSON published a paper (No. 183.) in *The Philosophical Transactions*, “to prove that hydatids, often met with in morbid animal bodies, are a species of worms or imperfect animals.” Since that time, they have been particularly examined by PALLAS,

LINNÆUS, MÜLLER, HUNTER, MONRO, GOFZE, BLOCH, LAMARCK, CUVIER, BRERA, RUDOLPHI, ZEDER, LAENNEC, BREMSE, CLOQUET, CRUVEILHIER, and others.

5. I. DESCRIPTION OF HYDATIDS, AND OF THE CYSTS CONTAINING THEM. — M. CRUVEILHIER remarks, that, if we represent to ourselves soap-bubbles of various sizes, the contained air being replaced by a fluid of perfect limpidity, the envelope formed by a film of coagulated white of egg, we shall have a very exact idea of *acephalocystes*. They vary in size from a millet seed to that of the largest orange; their form is spheroidal; and their specific gravity is nearly the same as water, although they generally sink when plunged in this fluid. When compressed, they resume their spherical form as soon as the pressure is removed. They are in general transparent and clear; sometimes only translucent; it is but rare that the fluid they contain is at all turbid. The various tints they present depend upon their envelopes, which have sometimes an opaline hue, either in particular points, or throughout their surface. Frequently semi-transparent flocculi are seen swimming in the liquid, and appear reticulated or plaited. M. CRUVEILHIER considers these as the débris of the internal pellicle of the hydatid, and the result of changes after death. Their external surface is generally smooth, uniform, and without crochets, or sutoria; and when their fluid is evacuated, they present neither heads nor mouths — *Hydatid levis*. — If, therefore, they are to be considered as possessing individual animal existences, they are the simplest and lowest of animal creation. Examined with the microscope, the opaline appearance of their parietes proceeds sometimes from a thickening of the membranes forming them; at other times, from small whitish and hard granulations on their interior surfaces. They are without the smallest appearance of vessels of any kind.

6. When punctured, the contained fluid escapes in a jet tolerably strong and continued; the envelope, eminently elastic, contracts, and presents only about one third of its former capacity, and acquires double or treble its former thickness. Although transparent at first, it becomes semi-opaque, or opaline; and, although very extensible and elastic, it tears readily when it reaches the limits of extension. The fluid of an hydatid is not coagulated by heat, but it contains a little albumen and some salts, amongst which the chloride of sodium is predominant. The membrane, according to M. COLLARD, is composed of — *first*, an albuminiform substance, which, however, differs from albumen in being soluble in hydrochloric acid: *second*, of a substance analogous to mucus, but differing from mucus in its insolubility in alkalies; in its want of action on the acetate of lead; in its great solubility in the hydrochloric, sulphuric, and nitric acids, without the disengagement of gas; and in the circumstance of water restoring its physical and chemical properties after it has been dried. From these M. COLLARD infers, that the hydatidic parietes consist of a peculiar substance.

7. Anatomically, they are composed, according to M. CRUVEILHIER, of four or five membranes, or laminae, of unequal thickness, each membrane also varying in thickness at different points; whence result their various degrees of opacity and trans-

parency. The small whitish granulations, already mentioned, are frequently found on the interior surface of the larger hydatids; but they are often wanting, especially in the smaller. They possess no regular form, but are elevated on the internal surface, carrying before them the internal pellicle. HENLE says that some hydatids possess another internal membrane, which is remarkably thin, but presenting here and there, or in groups, corpuscles of a glandular appearance; and that these inclose hydatids of a minute size, thereby illustrating the system of the inclosure of germs. BREMSER has seen, in free hydatids, globules likewise unattached, in the interior of which still smaller globules existed; successive generations thus appearing in the same cyst. Dr. JOHN HUNTER and LAENNEC also consider the granulations or attached corpuscles to be young hydatids; and the numerous minute vesicles observed with the microscope diffused through the fluid contained in a hydatid, to be of the same nature. Dr. HUNTER remarks, that, in their growth and decay, they pass through various stages: they are at first found floating in the fluid that fills the hydatid, and afterwards attached to its coats. The hydatid, thus pregnant with young, adheres to the neighbouring parts, increases in size, and becomes itself a sac, containing numerous small hydatids. These, after a certain time, decay, and the skins or empty bags are squeezed together into a substance resembling isinglass; and it is probable that they undergo still further changes.

8. Besides these minute granulations on the interior surfaces, and still minuter vesicles detected in the contained fluid, and considered by M. CRUVEILHIER to be the debris of the internal pellicle, as described above (§ 5.), M. LAENNEC has remarked, in some instances, small germs or sprouts of an irregular form or size on the exterior surface. These he considers as nascent hydatids, which in a certain stage of growth are detached, and increase the number in the surrounding fluid. According to these writers, and to Dr. BARON and Sir A. COOPER, hydatids may be so produced as to form a number of concentric layers, resembling the crystalline lens, or the coats of an onion, with the fluid interposed between each layer. In such instances, it is to be presumed that the most internal is the last formed, and that the more external become condensed, and ultimately disrupted and altered by the development of those in the centre.

9. M. CRUVEILHIER distinguishes hydatids into two varieties—the solitary and the multiplied—the *Acephalocystis eremita vel sterilis*, and the *A. socialis vel prolifera*. The first is most common in the lower animals, the second in man. The former rarely is confined to one situation, organ, or part, but invades several organs, or even a number of parts at the same time; the latter is as rarely produced in several parts of the same body, or even in different parts of the same organ.—a. The solitary hydatid is often found in thousands in the lungs, the liver, &c. of ruminants. M. CRUVEILHIER observed them at the same time in the lungs, the spleen, the kidneys, and the heart, of both sheep and oxen. The enveloping pellicle of the hydatid is altogether similar to that covering the interior of the cyst, but is without any kind of adhesion to it. This pellicle is semi-transparent, and presents a number of whitish points or granulations. The

inclosing cyst is generally fibro-cartilaginous, and is not always spherical. Sometimes one or several partitions separate the cyst into as many cells, in each of which a hydatid is lodged, and exactly moulded. The tissue of the organs surrounding these cysts is quite unaltered.

10. b. The multiplied hydatids are always in greater or less numbers. From an hundred to a thousand may be contained in the same cyst or sac, varying from the size of a millet seed to that of the closed hand. They swim in a fluid presenting varying appearances. Sometimes this fluid is perfectly limpid; at others it is yellowish, especially in the hydatidic cysts formed in the liver; and it occasionally is puriform or purulent; yet, in this latter case, the hydatids themselves usually preserve their limpidity,—a circumstance, amongst others, proving their independent existence. When the fluid of the cyst, in which the hydatids are contained, is otherwise changed, and especially when it becomes more consistent, or presents characters materially different from the above, the hydatids are disrupted, broken down, emptied, and apparently dead.

11. c. The cysts which inclose either one (the solitary or multiplied) of hydatids, is generally strong and composed of several laminae, which separate easily, and present the characters of fibrous tissue. They frequently contain cartilaginous or ossific patches; and the thickness of the parietes is usually in proportion to their size and age. They are externally adherent to the surrounding tissues by loose cellular substance; but they are occasionally attached more firmly by a cellulose-fibrous structure. The organ in which they are situated is commonly unchanged; but when pressure is exerted by them, the surrounding parts are atrophied, or converted into a fibrous substance. The internal surface of the cysts is often rugose, and rarely polished or quite smooth. It has not the appearance of sero-fibrous surfaces, and yet it secretes the fluid in which the hydatids swim. It sometimes presents cracks or crevices, or solutions of continuity, from the distention caused by the growth of the hydatids, and increase of the fluid filling the cysts.

12. The hydatidic cysts are lined by a membrane, similar in all respects to that which constitutes the proper parietes of the contained hydatids, and presenting the same elasticity, fragility, colour, and physical and chemical properties. This membrane may be separated into several lamellae. Its thickness is in proportion to its capacity. Its external surface nowhere adheres to the parietes of the cyst, and its internal surface is quite smooth. M. CRUVEILHIER considers it to be a large hydatid, enveloping and containing those which are smaller. It lines not only the cysts of the multiplied hydatids, but also those of the solitary. In the former, however, its internal surface is studded with minute granulations, some of which are isolated, and the others agglomerated. These granulations, as in the case of those observed in the interiors of the larger hydatids, are doubtless the germs of the free and smaller hydatids.

13. When a morbid action exists in the parietes of the sac, or cyst, or when they secrete pus instead of serum, then the enveloping acephalocyst is detached, and its debris are found mixed with the puriform secretion. The granulations or germs

are also altered, and the contained hydatids are often more or less changed. In such cases, the morbid secretion from the internal surface of the diseased cyst is destructive to the vitality, first of the enveloping or parent hydatid, and consecutively of those which it contains.

14. The vitality and independent existence of hydatids are shown not only by their reproductive powers, but also by the preservation of the animal substances composing them from the changes, or the decomposition, which these substances always undergo when they lose their organic connection with living parts. Yet, although thus possessing a certain, but a low, amount of vitality, they cannot be elevated to the rank of animals; for they possess neither sensibility nor mobility, although their parietes present signs of organic contractility. They may be viewed, therefore, as the lowest or incipient states of separate animal organisation, from which there is a gradual rise in the scale of existence, through the vesicular and flattened parasitic worms, up to the more perfect animals.

15. d. Hydatids undergo many consecutive changes, some of which originate in disease, either of their containing cysts, or of themselves. Occasionally these cysts break, either exteriorly or into a serous cavity, or upon a mucous surface; and this occurrence may be either fortunate or fatal, according to the situation in which it takes place. If the rupture occurs on a cutaneous or mucous surface, the admission of air causes propturati. If it occurs in a serous cavity, which is rarely observed, fatal inflammation is thereby occasioned. Frequently, however, owing to the death of the hydatid, absorption of the fluid in the cyst takes place; the parietes contract, and approach towards the centre; and the remaining contents become remarkably changed, and often assume a tuberculous, putty-like, cheesy, or purulent form, the hydatidic membranes being pressed together, or otherwise altered. According to RUYSH, BREMER, and others, hydatids may thus degenerate into atheromatous, steatomatous, or melicerous tumours, especially when they occur in the ovary. This opinion has been zealously and ingeniously argued for by Dr. BARON. He supposes that the hydatid, or vesicular form, is that in which tuberculous, scirrhus, sarcomatous, steatomatous, and fungous productions originate; and that the transformation may take place at any period, or may not occur at all. The co-existence of hydatids with one or other of these formations has been urged in proof of this doctrine; but there has been no evidence of any of these having originated in hydatids, nor has the transition of the one morbid structure into the other been even partially demonstrated. The co-existence of these different productions in the same subject, that is sometimes observed, and that furnished the chief basis of this doctrine, is merely a coincidence arising out of a fully ascertained circumstance,—that the same states of constitution, of vital activity, and vascular action, which favour the production of the one structure, also predispose to the other.

16. II.—PSEUDO-HYDATIDS, SIMPLE CYSTS, or vesicles, have been very commonly confounded with true hydatids. From this circumstance it will be necessary to take some further notice of them at this place, than has been taken in the article DISEASE (§ 113—115.). They are found either

entirely or partially in contact with the adjacent tissues, are supplied by these with the fluid they contain, and are nourished by them. Dr. KIST has divided them into two varieties, viz. those which consist of *simple cysts*, or bladders capable of being detached without lesion of structure, and those which are *compound*, and which appear as diverticula from the subjacent membranous expansions, from which a separation at their bases cannot take place without laceration of a part essential to the integrity of one or the other.—A. Under the *former* head may be arranged—1st those cysts met with under the common integuments, that contain a sebaceous, atheromatous, or meliceritious substance, secreted by the cyst, and causing its distention;—2dly, those cysts formed by complete obstruction of a canal conveying secreted fluids, as ranula, those found in the labial glands, and the surface of the kidneys, &c.;—3dly, those proceeding from the distention of cells naturally existing in organs; by a morbidly increased and altered secretion; as in ovarian dropsy, and disease of the thyroid gland;—and, 4thly, those serous cysts often found in the plexus choroides, sometimes in the eyelids, more rarely in the lungs, the female mamma, and other parts of the body. These last sometimes acquire a large size, especially when seated near the surface of any of the abdominal or thoracic viscera, and constitute encysted dropsy. The cysts belonging to this class are generally simple, distinct, and solitary. When two or more of them are developed in one part, as in the plexus choroides, the association is owing to the same cause which produced the one, having likewise operated in its neighbourhood. This has been well shown by Dr. HODGKIN. (*Med. Chirurg. Trans.* vol. xv. p. 266.).

17. The formation of this species of cysts, especially of those which cannot be referred to the obstruction of canals or orifices of ducts, has been a subject of much speculation. It has been supposed by some, that they are produced by the obstruction and consequent dilatation of absorbents, or of other vessels not admitting the passage of red blood. This, however, is only a supposition. In a paper which I published in 1821 (*Lond. Med. Repos.* vol. xv. p. 378.), I suggested their origin in effusion into one or more cells of the areolar tissue, the state of the effused or secreted fluid, and the changes in the tissue immediately surrounding and confining the fluid, preventing the diffusion of the secretion in the adjoining parts, and giving origin to the parietes of the cyst. If serum accumulates in one or more of these cells, owing either to morbidly excited action, or to impaired absorption; in connection with an impermeable state of the surrounding tissue, this latter will be impacted around the collected fluid, and the albuminous portion of this fluid will attach itself to and line the sides of the cavity thus formed. As the effusion increases, this cavity will enlarge; the parietes formed by the impacted areolar tissue will become firmer and denser; the albuminous portion of the secretion will continue to attach itself to the parietes, if it be in small quantity, where it will become organised, or even converted into a serous surface; and the cyst will present several coats or laminae, thus produced from the condensed surrounding tissue, and from the successive depositions of albuminous pellicles on its internal surface from the secreted

fluid. At the same time, it is not improbable, that many of the simple cysts are actually formed before the fluid they contain, as supposed by BICHAT, and as admitted by me, in the article DISEASE (§ 115.). The fluid in the cyst, particularly when it is thick, or more remarkably albuminous, or muco-albuminous, may undergo various changes, arising either from its properties at the time of its secretion, or from the states of local and general action and of constitutional or vital power. These changes may also be further aided by partial absorption of its watery parts, or by the tendency of its chemical elements to form new combinations, when removed to a certain extent beyond the vital influence, and still subjected to an elevated temperature. To these circumstances may be attributed most of the appearances observed in the contents, as well as in the tunics, of the class of *simple cysts*, and described in the article DISEASE (§ 113—115.), whether the cysts are first developed as a serous membrane, or are formed by the fluid effused into the areolar tissue.

18. *B. The compound variety of cysts (§ 16.)* are those whose parietes possess the property of producing other cysts of a similar character to themselves, or, as Dr. HODGKIN has shown, other morbid growths, which, if they do not present, strictly speaking, the character of cysts, are nevertheless referrible to the same type or mode of formation. Cysts of this kind, like simple cysts, are found in different parts of the body, but are by far most frequently seen, acquire the largest size, and present the greatest variety of appearances, in connection with the female organs of generation. In this variety, elevations more or less rounded, and of various sizes, are observed projecting on the interior surface of the principal cyst, and are covered by a membrane continuous with that lining the interior of this cyst. Dr. HODGKIN remarks, that on making an incision into these projecting elevations, they are found to be cysts of a secondary order, filled by a secretion, often serous, but almost as frequently mucous. On an intimate inspection of those secondary cysts, the germs of other or tertiary cysts are also found projecting from their interior surfaces, upon which is reflected the living membrane of the cyst in which they are contained. Secondary cysts sometimes afford as complete specimens of a reflected serous membrane, as either the pericardium or the tunica vaginalis; the lining membrane of the containing cyst corresponding to the reflected portion, as that covering the contained bunch of cysts does to the close portion. The proportion which the contained cysts bear to the cavity of the membrane reflected over them, is extremely various. Sometimes the fluid, especially when it is serous, nearly fills the containing cyst, whilst the bunch of secondary cysts is of very inconsiderable size. At other times, the principal cyst is almost entirely filled by those of the inferior order; in which case the nodulous or tuberosc elevations found on the exterior of the former, are occasioned by the unequal development of the latter. It may even happen, that the distention, caused by the growth of the contained cysts, is sufficient to produce a rupture of the containing cyst, which admits both of the escape of its fluid contents, and of the unrepressed growth of the secondary or tertiary cysts, which took their origin from its internal surface. As the inferior cysts themselves are found to contain, as Dr.

HODGKIN has shown, a serous or mucous secretion, and very often to produce another order of cysts, possessing the same character with themselves, it is by no means surprising that these different orders of cysts, which sometimes have the appearance of delicate and pellucid vesicles, filled with clear and colourless serum, and possessed of the power of giving rise to a multitude of vesicles or cysts presenting the same character with themselves, should have been mistaken for true hydatids. But a little careful inspection would have shown that the bunches or clusters of secondary cysts are invariably attached to and continuous with the internal surface of the primary or containing cyst; and that delicate vessels ramify from the one upon the other.

19. It is reasonable to infer, that these compound cysts will present diversified appearances, and give rise to various changes, according to their duration, to the state of vascular action in the parts in which they are formed, and to the constitutional or vital power of the patient; and that, according to the alterations which may take place in these cysts and in their contained fluids, adventitious formations, of various kinds, and even scirrhus and carcinomatous structures, may be ultimately developed. — My limits will not permit me to describe the various appearances which these compound cysts may present, in different situations, and at different epochs of development, or to trace the various changes they undergo, far less to speculate upon their transformation into malignant or other structures. I must, therefore, refer the reader to Dr. HODGKIN's ingenious and able paper on this subject.

20. III. TRUE HYDATIDS have been found in almost every organ or structure of the human body. Instead, however, of considering them in this place with reference to *their seats* in the brain, in the lungs, in the heart, in the liver, in the kidneys, &c. &c., I have, conformably with the plan of this work, noticed their occurrence in these organs, in the articles devoted to the pathology of the several viscera. In these articles, as well as in some others, the *symptoms* they occasion, and the *treatment* they require, in their various localities are more fully and sufficiently discussed: I here confine myself to a general view of these subjects.

21. IV. REMOTE AND IMMEDIATE CAUSES. — *a.* Attention to the circumstances in which hydatids present themselves in man and in the lower animals proves, that they generally originate in whatever impairs vascular activity and vital power; and, of the causes which produce this effect, none are more influential than unwholesome and insufficient food, living too exclusively on vegetable diet, and residence in humid, cold, and low situations. Indeed, in the lower animals, they may be produced at will by insufficient nourishment, by humidity, and by food consisting chiefly of green succulent vegetables. Conjoined with these, debility arising from previous disease, convalescence from febrile or epidemic maladies, and the depressing passions, exert more or less power. There is reason also to infer that local injury, as well as local debility, has some share in determining the seat of these parasitic productions.

22. *b.* Various attempts have been made to account for their origin. BARRON believed them to arise from the dilatation of lymphatic vessels; the

valves forming a limit to the vesicles. M. ANDRIEUX has recently attributed their origin to a deposit of a fibrinous clot in the areolar or other tissues. He supposes that a minute fibrinous concretion, secreted by blood-vessels in a state of morbid action, assumes an incipient form of organisation, and that hydatids are an advanced grade of such organisation. This supposition is supported by the well known fact that fibrinous concretions formed on serous surfaces, although at first amorphous, ultimately become organised. As the origin of true hydatids is susceptible of the same explanation as that of the *Vesicular and other Parasitic Worms*, the reader is referred to what is advanced on this subject in the article *Worms*.

23. V. SYMPTOMS.—The formation of hydatids being attended by no appreciable lesion of function or of vascular action, the general symptoms are most uncertain, if, indeed, they be not entirely unascertained, especially in the early stages of this malady. Hydatids are developed so slowly and so entirely without vascular determination and excited action, that the organs in which they are seated adapt themselves to the pressure or slight displacement of parts they may occasion. When, however, they are seated within the cranium, or when their bulk in other situations becomes great, then the disorder they may occasion is made more manifest; although, even then, the constitution compensates very remarkably with the action. It very frequently happens, that

idea has been entertained of the existence of productions, in persons who have laboured long under slight ailments, until detected accidentally in a *post mortem* inspection. It is only when the hydatidic cyst has acquired a volume so considerable, as to give rise to a palpable or visible tumour, that we can suspect its nature. In such cases, the suspicion is rendered more probable, when some degree of fluctuation, attended with a tremulous sensation, is perceived. This symptom, however, is illusory; for it attends other deep-seated collections of fluid. When, owing to the death of the hydatids, or to inflammatory irritation, or rupture of the containing cyst, suppuration affects this latter, then hectic fever, discolouration of the general surface, emaciation, and other attendants of organic lesion, take place. It sometimes happens that inflammation extends from the cyst to the adjoining parts, and that the morbid production thus makes its way either to the surface of the body, or into some internal cavity or canal. When it opens exteriorly, the nature of the malady then becomes manifest, and the recovery of the patient even possible.

24. VI. TREATMENT.—Our imperfect knowledge of the causes and symptoms of hydatids necessarily renders the prevention and cure of them also very imperfect. Such of the causes as seem to be more fully ascertained, should be avoided, and those general principles of treatment, found to be most successful when the human body is the seat of parasitic productions, should be adopted. I have shown, in the article *Worms*, that the chief principle of cure, next to the discharge of the parasitic animals, is to impart tone and vigour to the constitution, so as to enable it to resist their reproduction or increase, and to throw them off with the secretions and excretions, when a more immediate and direct removal of them cannot be effected. We may consider as axioms in

pathology and therapeutics, that parasites form, multiply, and increase, in proportion as the parent becomes weakened, and as the secretions and excretions accumulate, or are retained; and that they diminish, and ultimately disappear, with the full restoration of the vital power, and of the secreting and excreting functions of the animal which produced them. The practical application of these axioms to hydatids is very manifest. The principle being admitted, the selection of individual means will depend upon the seat of these productions, and upon the peculiarities of individual cases. In most instances, however, the preparations of iron, those of iodine, the iodide of iron, chalybeate mineral waters, camphor, and the balsams, the various vegetable and mineral tonics, and the promotion of the secretions and excretions, by a combination of mild purgatives with stomachics and bitters, will be appropriate.

25. With respect to the propriety of puncturing the hydatidic cyst, in circumstances appearing to require this measure, much will depend upon its seat, with respect to the external surface, to serous membranes, and to internal canals. For, where this operation is likely to risk effusion into an adjoining serous cavity, as into the peritoneum, or to induce inflammation of a serous membrane, it ought not to be attempted. When the cyst is seated near, or has reached, the exterior surface; when inflammation and adhesion have obliterated any cavity intervening between it and the exterior; and when the integuments have become inflamed and accumulated, so as to point out the situation where only a puncture should be made, then it may be undertaken. As to the other points of treatment, they will come under consideration in the places where hydatids, seated in the internal viscera, are discussed.

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HYPERTROPHY.—Syn. *Hypertrophia*, (from
ύψω, above, and *τροφή*, nutrition,) *excessive nu-
trition*. *Hypertrophie*, Fr. *Die Uebernährung*,
Germ. *Enlargement of a tissue or organ from
excessive nutrition*.

CLASSIF. — GENERAL PATHOLOGY. — *Morbid
Structures, General Therapeutics*.

1. *Hypertrophy* is a term introduced by French
pathologists to signify excessive nutrition of
a tissue or organ, and often very loosely employed
by them, and by some recent English writers,
whose imitation of the former has been more close
than judicious. According to the derivation and
definition of the word, hypertrophy should be
applied only to an increase of nutrition of a tissue
beyond what is natural, and not to the augmented
bulk arising from adventitious depositions in
areolar or other structures. To this latter, however,
it has been frequently applied by some recent
authors. M. CRUVEILLIER has suggested a division
of hypertrophy into the *physiological* and *patho-
logical*; but the one variety frequently passes into
the other, or the only difference between the two
may be that of locality. All the pathologi-
cal facts, he adds, relative to hypertrophy, may be
referred to the three following heads: *first, simple
and pure hypertrophy*; *secondly, hypertrophy with
induration*; and *thirdly, hypertrophy with trans-
formation*. But, as M. ANRIAL justly remarks,
the term hypertrophy should be applied exclusively
to those cases in which the tissue, whose volume is
increased, retains its natural structure and organis-
ation. Hypertrophy, thus restricted, may exist
in any one of the various elementary tissues, or
even contemporaneously in two or more of them.
It may also occur in organs formed by the com-
bination of several of these tissues, and there affect
only one, or extend itself to two or more. In
either of these states, hypertrophy may be con-
sidered as a simple lesion, although it may be
attended by increased firmness and density, which
are generally observed to exist in hypertrophied
tissues. It more frequently, however, occurs in
complicated states, or associated with some trans-
formation of, or deposition in, collatitious or ad-
joining textures. In such cases it is difficult to
determine whether the hypertrophy, or its asso-
ciated alteration, is the primary lesion, or how far
the one may be dependent upon the other. In
many instances of hypertrophy of one tissue, the
collatitious tissues are more or less atrophied, in
this case the sequence and dependence of change
are manifest. From these considerations, hyper-
trophy may be divided into, 1st, the *simple*, and
2dly, the *associated or complicated*; the latter, how-
ever, being so diversified as to preclude a description
sufficiently brief and consistent for this article. The
subject, however, under both these heads is suf-
ficiently discussed in the articles devoted to the patho-
logical anatomy of the individual tissues and organs.

2. **I. NATURE OF HYPERTROPHY.**—When this
change occurs simply, without any associated alter-
ation, it can be referred only to an excess of nutritive
function; and an active state of the circulation,
dependent upon increased nervous power, may be
considered as the conditions requisite to this ex-

cessive state of nutrition. This fact is proved by the physiological consideration of the subject, especially by those employments in which particular muscles are principally exercised and consequently developed. In these instances, volition determines a more frequent and energetic contraction of certain muscles, and such contractions require an increased supply of blood : whence, ultimately, results augmented development. What is familiarly demonstrated in the voluntary muscles also takes place in the involuntary, under analogous circumstances ; thus, the constant or repeated efforts made by the ventricles of the heart, by the parietes of the stomach, by the urinary bladder, or even by the intestinal canal, to overcome an obstacle placed at their outlets, or to procure a free passage for their contents, are followed by excessive development of their muscular structures, and are attended by a relative increase of their vascularity. In these instances, the first change in the hypertrophied part is manifestly excited or increased organic nervous influence. This determines not only excessive muscular contraction, but also augmented vascular determination, and, as the general result, superabundant nutrition. On this point, the opinion of Dr. CARSWELL, who has written with more precision on this subject than any of his contemporaries, agrees not materially differ from my own. He

that an increased supply of blood is necessary to hypertrophy, but has left out of consideration the share which the nervous power has in the production both of this increase, and of the excessive nutrition which follows. He justly remarks, that the nature of hypertrophy merits due consideration, as involving the principle on which the treatment of it should be founded, and as establishing a law directly opposed to the doctrine that this lesion is the primary element of certain adventitious structures. M. ANDRAL has proposed this doctrine, and has contended, that hypertrophy of the cellular tissue forms a necessary condition in the production of scirrhus and carcinoma. But although the cellular tissue may be more or less hypertrophied in these maladies, this alteration is associated with others less physiological, and is infinitely more morbid than it, in their vital and organic relations.

3. II. CAUSES AND ORIGIN.—Hypertrophy, in some of its forms, or with reference to certain tissues, may depend upon a predisposition existing in the organisation. Some persons have an hereditary predisposition to an excessive development of the adipose tissue ; obesity occurring in these, however abstemious they may be. Others present also an hereditary predisposition to enlargement of the bones, or of the lymphatic, or other glands. The common *exciting causes* of hypertrophy are,—*first*, the increased action of a tissue or organ ; *secondly*, the prolonged influence of an irritant or stimulus. Either of these classes of causes may induce hypertrophy, in its *simple* or *complicated* forms.

4. A. *Increased action or function* of a part give rise most frequently to hypertrophy in its *simple form*. It then may be considered as purely *physiological* ; thus, the blacksmith has the muscles of his arms powerfully developed, and the opera-dancer, those of his lower extremities. The hypertrophy in such cases is frequently attended by an atrophy of other muscles, not brought into

action. The drayman, or coalheaver, has the muscles of the arms and trunk strongly formed, whilst those of the legs are imperfectly developed, their action being confined, or entirely suppressed, by the thick-soled shoes they are accustomed to wear, and by their shuffling gait. Increased action, or action of the heart, is often followed by excessive nutrition, even independently of lesion of the orifices and valves. Obliteration of an arterial, or venous trunk, causes enlargement of the collateral vessels. Destruction of one kidney, or of one lung, gives rise to marked augmentation of the size of the other. Obstacles to the evacuation of the contents of the hollow viscera occasion hypertrophy of the parietes of these viscera, owing to the increased action required to overcome these obstacles ; but the increased action in such cases operates similarly to that produced by excited function, in the circumstances just adverted to.

5. B. *The protracted operation of a morbid stimulus, or irritant*, is the most common cause of these forms of hypertrophy, which may be denominated *pathological*, and which are most frequently *complicated*. These forms were arranged by DUPUYTREN under the denomination of *nutritive irritations*. They are not always instances of pure hypertrophy ; but, as they often result from a state of chronic inflammation, so they are attended with, and even partially dependent upon, a deposition of coagulable lymph, which has become more or less organised and identified with the tissues in the areolæ of which it has been effused. There is every reason to believe, that many of the cases of hypertrophy said to have been observed in the cellular, serous, mucous, and glandular structures, either singly or complicated with other lesions, were actually referrible to this category. Indeed, it is by no means easy to distinguish the enlargement caused by the effusion of lymph, which has become thus organised from pure hypertrophy, particularly as respects the tissues just enumerated, and when other organic lesions are also present in the affected part. That, however, hypertrophy actually takes place from prolonged irritation, is proved by the changes produced by this cause in the integuments, the mucous, and serous surfaces, the cellular tissue, &c. Most of the forms of associated or complicated hypertrophy, noticed in the articles on the pathological anatomy of the different tissues and organs, are referrible to causes which fall under this head.

6. III. CHARACTERS.—*a*. Increase of *bulk* is not always characteristic of hypertrophy ; for hollow viscera, as the heart, stomach, urinary bladder, &c., may have their parietes very much thickened, without their dimensions being externally augmented. Hypertrophy may exist even although the apparent bulk of the organ is diminished. In such instances the thickness of the parietes must be considered with reference to the external dimensions and internal capacity of the organ.—*b*. The *form* also of a tissue or part will also be changed or modified in some degree, but chiefly when the hypertrophy is circumscribed. This is demonstrated most remarkably in cases of hypertrophy of the bones, skin, mucous tissues, &c.—*c*. The *consistence* of the hypertrophied part is generally somewhat altered. It is most commonly more or less increased, particularly in the cellular tissue,

lymphatic glands, brain, skin, &c. Diminished consistence is never met with, excepting in some rare instances of complicated hypertrophy, when the enlarged tissue has experienced consecutive change.—*d.* As increased size, and generally also augmented density, or firmness of the hypertrophied tissue, obtain, it must necessarily follow that the weight of the part is also greater.—*e.* The colour is increased, unless the blood-vessels are compressed by the enlarged structure; as sometimes observed in the brain, in the bones, and cellular tissue.

7. IV. The Effects of hypertrophy are—1. Increased action relatively to the augmentation of size, as in hypertrophy of the heart, of the urinary bladder, &c. 2. Compression and atrophy of the collatitious textures, particularly when one or more of the tissues of an organ or part is enlarged. 3. Diminution of a cavity, or of the canal of an organ, as in concentric hypertrophy of the ventricles, and in some instances of hypertrophy of the urinary bladder, or of portions of the digestive tube. 4. Compression of adjoining organs, when a viscus is greatly enlarged; and, 5. Augmented development of the vascular system of the hypertrophied part.

8. V. The General Treatment of hypertrophy may be conducted with the following intentions:—1. The removal of the exciting and pathological causes, when this can be attempted. 2. The diminution of the quantity and richness of the blood, by depletions and low diet, as far as may be consistent with the circumstances of particular cases, and localities of this lesion. 3. The prevention of local determination of blood, particularly to the hypertrophied organ or part, and the derivation of it to other situations. 4. The avoidance of local and general excitement, and the procuring, as much as possible, the repose of the affected organ. All these intentions are not equally applicable to every case, and some of them should be entertained with caution in certain circumstances. Thus, when hypertrophy depends upon repeated efforts to evacuate fully an organ, the second indication ought to be either very cautiously or very partially fulfilled. The particular means or remedies which may be selected to accomplish these intentions should depend entirely upon the seat of the lesion, and the peculiarities of individual cases; they are fully noticed in the places where the particular forms of hypertrophy are discussed.

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HYPOCHONDRIASIS. — SYN. ὑποχονδρία, the Hypochondre; ὑποχονδριασος, adj. (from ὑπο, under, and χονδρος, cartilage.) Hypochondria, Auct. Lat. Morbus Flatusus, Diocles and Aëtius. Malum Hypochondriacum, Galen, Hoffmann. Morbus Hypochondriacus, Fiacastori. Morbus Resicatorius; Morbus Ructuosus; Passio vel Affectio, vel Melancholia, Hypochondriaca, Auct. var. Mater Scorbuti, de Barbetto.

Hypochondriasis, Sauvages, Linnæus, Cullen. Hallucinatio Hypochondriasis, Crichton. Atusia Hypochondriasis, Good. Dyspepsia Hypochondriasis, Young; Hypochondrie Maladie Imaginaire, Fr. Die Hypochondrie, Grillenkrankheit, Germ. Ipochondria, Ital. Neuropathy, 1. M. Gully. Hypochondrism, Hyp. Vapours, Hypochondriasis, Low Spirits, Hypochondriac Passion, Nervousness.

CLASSIF. — 2. Class, Nervous Diseases; 2.

Order, from want of vital power (Cullen).

4. Class, Diseases of the Nervous Function;

1. Order, Affecting the Intellect (Good).

1. CLASS, IV. ORDER (Author, in Preface).

1. DEFIN. — Chronic indigestion with languor, flatulency, dejection of mind and fear, arising from inadequate causes; general exaltation of sensibility; a rapid succession of morbid phenomena, simulating numerous diseases, or otherwise a real, but variable state of suffering, exaggerated by the morbid sensibility and fears of the patient, with unsteadiness or variability of purpose, and distressing anxiety respecting his complaints.

2. Hypochondriasis has been very differently arranged by nosological writers. VOGEL placed it amongst spasmodic diseases, and CULLEN, much more correctly, in that order of nervous complaints which depend upon defective vital power. SAUVAGES, LINNÆUS, PINEL, and GOOD included it in the class of mental affections, but as nearly allied to insanity. with Dr. PERHARD in considering the arrangement of these latter writers not to be justified the history of the disease, and for reasons that will be stated under the head of Diagnosis.

3. 1. DESCRIPTION and HISTORY. — A The first, or slightest degree, or stage of this malady, is generally confined to disorder of the digestive organs; its invasion and progress being commonly slow. However, in a very few instances, its attack is sudden, and its course more rapid. The disorder of the digestive organs is always real, although more or less exaggerated, and attended by a sentiment of general uneasiness or distress, referrible to an increased susceptibility, or morbid sensibility, especially of the organic nervous system. The appetite is sometimes not affected, but it is occasionally variable or deficient, or even excessive. Digestion is slow and difficult, and the patient complains of pain, oppression, or distention in the stomach, or hypochondres after a meal. These sensations are attended and aggravated by flatulency, and borborygmi, and sometimes by acid or acrid eructations. Occasionally the abdomen feels hard from flatulent distension, and various symptoms characteristic of chronic indigestion, as cardialgia, sense of heat in the course of the œsophagus, nausea, hemicrania, twisting or griping pains in the abdomen, &c., are complained of. In a few instances, the appetite is perverted, particularly in hypochondriacal females, or during pregnancy, a morbid desire for indigestible or the most improper substances being present. Thirst is seldom much complained of. The tongue is commonly loaded or covered, towards the root and middle especially, and particularly before breakfast, with a mucous coating. The mouth is clammy, and the taste somewhat perverted. The breath is generally offensive. The nausea is sometimes attended with a vomiting of mucous fluid, or of an acid

matter, with half digested food, and sometimes with a sort of salivation. The flatulence of the digestive canal excites, or is accompanied by, sympathetic pains in various situations, which are alleviated by eructations, and especially by the expulsion of the air downwards, but these pains usually return, although not always in the same place, or with the same characters. The bowels are generally costive, but they are occasionally irregular; constipation, with colicky pains, sometimes alternating with diarrhoea. The relaxation of the bowels seldom affords relief; and when it is prolonged, it often increases the anxiety, depression, and nervousness of the patient. The urine is occasionally natural, but it has frequently been observed by SYDENHAM, HOFFMANN, and CHRYNE, more than usually limpid and abundant. It is sometimes loaded, or deposits a copious sediment, as in dyspeptic cases. Palpitations in the heart, and in the epigastric region, are sometimes felt, and excite great uneasiness in the patient's mind.

4. *B. The second degree, or stage of the complaint,* is even still more diversified than the preceding. The symptoms already detailed continue undiminished, are often aggravated, and are accompanied by others, referrible to the brain and organs of sense, and sometimes also to the thoracic cavity, notwithstanding the severe train of symptoms, and distressing feelings of the patient. He frequently presents the appearance of a robust man, or even robust health. He often complains of violent pains in the temples, forehead, or occiput, or of general headache, with dimness of sight, and noises in the ears; or of a sense of weight or pressure, more intolerable than pain, at the vertex, with giddiness or confusion of mind; and sometimes of a constriction, or tightness in the head or temples, or of a morbid sensibility of the scalp, and roots of the hair. Occasionally the senses are morbidly acute and intolerant of light and noise. Pains resembling rheumatism, or those of syphilis, are felt in various situations, occasionally with a feeling of burning or heat, and sometimes with coldness, horripilations, numbness, cramps, feebleness, or threatened paralysis of one or other of the extremities. Weakness of the limbs, unsteadiness in walking, or feebleness of the joints, (in some instances, with neuralgic pains,) and great susceptibility to cold and heat, are not unfrequently also complained of. The morbid sensibility of the hypochondriac is generally increased by a cold and humid state of the atmosphere, by easterly winds, and by very warm seasons. His mind is incapable of exertion or prolonged attention, although, when aroused, he may be lively and acute; but he soon becomes engaged with his own feelings and sufferings. To these he frequently recurs in conversation, whenever he has an opportunity of doing so, although he seems to suspect that the subject is unpleasant to those who listen to him, and therefore suppresses a part of his complainings. In some cases there is dyspnoea, constriction of the chest, with a dry, short, or spasmodic cough, and occasionally a sense of suffocation or constriction is felt in the throat, with flatulence and various other symptoms resembling those attendant on hysteria. These phenomena have induced several writers to consider the disease closely allied to hysteria, and the severe palpitations, or irregular action of the

heart, frequently also complained of, have further countenanced the idea; whilst they have excited the anxiety of the patient, and induced him to believe himself the subject of irremediable disease of the heart. Sleep is sometimes not materially disturbed, and occasionally the hour of repose is ardently looked for; but, in other cases, it is dreaded as aggravating the distress. Generally, as the disease advances, unquiet and distressing dreams, restlessness or insomnia, incubus and nervous agitations, are more or less complained of.

5. *C. The third or confirmed grade of this malady* presents nearly the same phenomena as have been detailed, but in a somewhat heightened and chronic form. The complaints of the patient have been varied, and a succession, of most of those enumerated has been experienced. The patient is often tortured with the most distressing feelings, which are greatly aggravated by his fears. He dreads impending dissolution, from the symptoms referred to the head, heart, or chest. His ideas are concentrated on himself and his feelings, and he is incapable of attention or mental exertion, unless aroused by circumstances of unusual interest or moment. This mental incapacity is increased by an idea that his faculties are impaired, and by his dread to exert them. Occasionally vertigo, dimness of vision, or intolerance of light and noise, are so great as to justify his fears; and the pains in the head, or the sensations of pressure on the head and temples, are so severe, that the eyes feel as if starting from their sockets. At the same time, the organic sensibility of the digestive canal is so acute, that the progress and operation of a dose of medicine are traced by him through the different compartments, and made objects of comment. Palpitation is felt at the epigastrium, and about the colic axis, and is sometimes attended with sensations of throbbing, extending to the extremities. Disorder of the digestive functions still continues more or less marked, and the tongue is either loaded, or covered with a mucous coating, or is flabby at its edges. The pulse is seldom very materially affected, unless the patient be subject to palpitations, or irregular action of the heart. In this advanced, or prolonged state of the disease, the countenance of the patient often presents an air of distress or suffering. In some cases, it becomes sallow; but, in others, his appearance has no relation to the intensity of the sufferings he expresses. Whilst most of the faculties of the mind are more or less weakened, the imagination is morbidly active, and is constantly engaged with the consequences or results of the disease, of which he believes himself the subject. His desire and hopes of recovery, however, prevent him from being weary of life, or from entertaining an idea of terminating it. On the contrary, he is most anxious to obtain relief; but is frequently unsteady in the use of means calculated to afford it. He has recourse to a variety of opinions; and is more ready to adopt what is recommended for his restoration, than to persevere in its employment, or to continue under the direction of the physician whom he has consulted.

6. *II. ASSOCIATIONS OR COMPLICATIONS.* — Judicious observers, who have studied the course of this malady, will agree in believing, that the symptoms characterising it are by no means imaginary. They evidently depend upon physi-

cal disease, in connection with a morbidly exalted state of sensibility. This physical disease commences in the digestive organs, attended with morbid organic sensibility, which extends to the cerebro-spinal nervous system, thereby aggravating and multiplying the morbid phenomena. The lesions, therefore, observed in the course of the malady, whether functional or structural, can hardly be denominated complications. They are rather integral or necessary parts of the malady, rendered more prominent, however, by the distressing feelings which they excite, or with which they are associated. In addition to the functional disorder of the *stomach*, and other chylipoietic viscera, characterising this complaint, the digestive canal often presents evidence of marked irritation, amounting, in some cases, to asthenic inflammatory action, or even to structural lesion of the mucous surface. The secreting function of the *liver* is also often disordered, and symptoms of congestion or engorgement of this organ, or even of inflammatory action, may occasionally be detected; and in these affections, the *gall-bladder* and *ducts* not unfrequently participate. The *spleen* is sometimes enlarged, and occasionally in connection with disorder in the biliary apparatus. Hypochondriacs often are subject to *hæmorrhoids*, owing to local or general plethora, or to costiveness, or to the use of irritating cathartics. This connection has been noticed by HIPPOCRATES, GALEN, STAHL, HOFFMANN, ALBERTI, HIGMORE, and others, and has been considered as being salutary in plethoric hypochondriacs, and when the hæmorrhoidal flux has not been excessive or debilitating. Some writers, particularly KOCI and BÜCHNER, have viewed the hæmorrhoids as the cause of the hypochondriasis; and I have met with cases which countenance the opinion, as well as with others which militate against it, and show that the removal of the former has increased the latter, by augmenting plethora, and disposing to affections of the brain. I was very recently consulted by a gentleman, who had been subject to hæmorrhoids and hypochondriasis, in its slighter form, the discharge from the former always relieving the latter for a time. The hæmorrhoidal affection was cured by surgical treatment; but the hypochondriasis was afterwards remarkably aggravated, and was followed by painful spasm and irritation about the sphincter. He consulted another eminent surgeon, who divided the sphincter; but the operation was succeeded by inflammation of the rectum, extending along the colon, with the usual dysenteric symptoms, fever, and the utmost distress. These having been subdued, the complaint in the rectum continued unmitigated; and the patient's hypochondriacal sufferings increased to the utmost. In this case, the local treatment, which was obviously injudicious, remarkably aggravated the disease.

7. Hypochondriasis either seldom occurs in FEMALES, or occurs only in a slight degree, as long as the catamenia continue regular; but when they are suppressed or diminished, or disappear at the natural period, it occasionally commences, or is aggravated. It may also occur in a slight form during pregnancy, and subside or disappear after delivery. Of this I have seen more than one instance. Pregnancy may also relieve this complaint, when the patient has been labouring under it for some time previously.

Organic disease, or irritation of the *uterus*, is one of the most frequent associations of hypochondriasis in this class of patients; and it may, moreover, not be the only one in the same case.

8. The symptoms referrible to the *head* are not always dependent alone upon altered or exalted sensibility. In addition to this state, there is often also congestion, or deranged circulation in the brain; but the cerebral affection is generally consecutive upon disorder of the digestive functions, and upon increased sensibility of the organic or ganglionic nervous system, even although the chief cause of the hypochondriasis has acted primarily upon the mind.

9. Hypochondriasis may be excited in the course of some organic malady, by the patient's attention being suddenly directed to the seat of disease, although his feelings and spirits had not been previously affected. This is not unusually the case with *affections of the heart*. I have seen more than one instance, where the detection of disease about the valves, or a particular examination of the heart by auscultation and percussion, led the patient to suspect what really existed; and the suspicion soon amounted in his mind to certainty, — his fears and distresses becoming even painful to the observer. The connection of hypochondriasis with the *gouty diathesis* has seldom been adverted to by writers. Yet I have met with several cases where the form comes on after the suppression or disappearance of gout. In such cases, disorder of the abdominal viscera is more or less marked; and is sometimes associated with deranged circulation in the brain. Indeed, this may be said to be one of the forms of misplaced gout: hypochondriasis, when prolonged or neglected, or aggravated by injudicious treatment, may pass into *melancholy*, or even into *insanity*; but this is much more rare than is supposed. In these instances, melancholic ideas, or some single delusion, is entertained, whilst the primary disorder either continues unchanged, or is partially absorbed in the superinduced malady.

10. III. DURATION AND TERMINATIONS. — a. The *duration* and *progress* of hypochondriasis are most indefinite. The accession of it is generally gradual and imperceptible, unless when caused by some overpowering impression or mental emotion. When judiciously treated, in its slighter forms, or during early periods, this complaint may be removed after a comparatively short time; but, otherwise, it may continue for years, with various mutations, and with indefinite periods of relief or exacerbation, depending partly upon the permanence of the causes, on the state of the season, or the occupations and amusements of the patient, or upon whatever may affect his general health and constitutional powers. It may even spontaneously cease for a time, and return again and again; or it may continue through life, without apparently shortening its duration: but, more frequently, the functional, or structural, lesion producing it gradually increases, until visceral disease of a very obvious kind is developed, and shortens existence, under the care of some practitioner who, most probably, had not witnessed the earlier progress of the malady.

11. b. The *terminations* of hypochondriasis are — 1st, in the restoration of health by medical treatment; — 2dly, by critical evacuations and spontaneous recovery; — 3dly, in the develop-

ment or supervention of organic or fatal visceral disease. *a.* The first of these can be accomplished only slowly, and by judicious recourse to medicine, regimen, and moral discipline. *b.* Critical evacuations are rarely observed. *Diarrhæa*, particularly when caused by a copious secretion of bile, and followed by a resolution of hepatic engorgement or biliary obstruction, occasionally affords some relief; but it rarely removes the complaint, unless it be aided by additional means. The same remark applies equally to *hemorrhagic discharges*. They furnish, however, indications of what should constitute, at least, a portion of the treatment in many cases. The spontaneous appearance of *cutaneous eruptions* has been noticed by BOERHAAVE, LORRY, VAN SWIETEN, HEIM, and REIL, as favourable occurrences; and enlargement of the external glands had also been considered critical by STOLL, KLEIN, and others.

12. *c. Organic, or fatal visceral disease*, is more liable to occur in hypochondriacs than in other persons, or than is commonly supposed. The parts most frequently undergoing structural lesion are the stomach, liver, and biliary apparatus, the brain and membranes, the large bowels, the heart and large vessels, the spleen, pancreas, uterus, and kidneys. Functional disorder of some one of these, in connection with derangement of its circulation and with exalted organic sensibility and nervous susceptibility, most probably gives origin to most of the patient's sufferings; and as these disorders proceed onwards to organic lesion, the malady advances, until this lesion is expressed by signs much less equivocal than those attending the earlier stages of the hypochondriacal affection. Insane delusions, melancholy, palsy, or epilepsy, may thus supervene from progressive structural change; but the former of these are by no means so common as generally believed. Palsy is a not frequent, and epilepsy is a comparatively rare, termination of this malady. Organic lesions of the heart and pericardium, as well as of the large bowels and urinary organs, are, however, oftener observed than has been supposed. The structural changes, met with in advanced or old cases of hypochondriasis, are chiefly the following.

13. IV. LESIONS OF STRUCTURE. — Various changes have been observed in the *digestive mucous surface*, the most important of which have been congestion, partial softening, discoloured spots, and slight ecchymoses. Thickening of the coats and induration, or an incipient state of *schirrus* of the pylorus, or cardiac orifice of the stomach, (BONER, &c.) have been more rarely met with. The liver has presented various lesions, the chief of which have been congestion, enlargement of the organ, and dilatation and engorgement of the *vena portæ* (LEUTAUD). I have found the *hepatic ducts* and *gall bladder* distended, enlarged, and filled with dark inspissated bile. Gall stones have also been found in the bladder and ducts. Alterations of the *spleen* have been observed by BONER and others, and of the *pancreas* by BRANDIS. The *large bowels*, especially the sigmoid flexure of the *colon*, the *cæcum* and *rectum*, frequently present changes similar to those noticed with reference to the digestive mucous surface generally, or are thickened, or somewhat contracted; and the colour is sometimes displaced. *Hæmorrhoidal tumours*

are often met with. A plethoric, engorged, or congested state of the abdominal viscera generally, has been remarked by THEDEN, BURGHAU, and LEUTNER. I have found calculi in the *kidneys* in one instance, and enlargement of the prostate gland and disease of the *bladder* in another. Alterations of the *uterus* have been noticed by some writers; and I believe that they are not rare in connection with hypochondriasis, especially after the change of life.

14. Organic disease of the heart and large blood-vessels is not unfrequent in hypochondriacs; but instances in which the structure and orifices and valves of this organ have been accurately examined after their death are remarkably rare. It is not improbable that some of the changes observed as a consequence of internal carditis, and of chronic inflammation of the large vessels, would be detected in some cases, if a careful inspection after death were instituted in persons who had been subject to this complaint. A plethoric state of the vascular system generally has been remarked by WINNKE, and a very dark and altered state of the *blood*, by TITLENUS and BURGHAU. Various lesions have been found in the *brain* and its *membranes*, particularly in cases wherein the patient's chief suffering had been referred to the head; but these lesions have either been very different, in different cases, or very imperfectly described; whilst, in some, little or no alteration has been detected. In short, the bodies of hypochondriacs have presented lesions as diversified as the complaints made during life; but these lesions have been very frequently overlooked, or no inquiry after them has been made, owing to the circumstance of the complaints of this class of patients having been very generally viewed as entirely imaginative.

15. V. DIAGNOSIS. — The diagnosis of hypochondriasis is most difficult; for the complaints of the patient are so distressing, and his sufferings apparently so extreme, that the inexperienced practitioner may be deceived by them, and believe them to proceed from dangerous states of disease, and to require the most energetic remedies. This simulation of organic and serious maladies, if it be not detected, may lead to a mischievous treatment. On the other hand, when a patient is known to be the subject of hypochondriasis, the circumstance ought not to induce us to overlook, or to treat carelessly, his sufferings, which are generally not only real, but also often depending upon structural changes, although these changes are either too obscure or too minute to be readily or easily detected. The versatility and mutations of the hypochondriac's sufferings, and the inconsistency observable between his complaints and his appearance, and between the local and general, or constitutional symptoms, will readily suggest the nature of the disease. Yet the symptoms sometimes continue without change; and the patient often makes the same complaint. In such cases, there is reason to believe that real disease exists, although exaggerated by his morbid sensibility and fears, by his imagination having long been engaged with his sensations in the seat of disorder. The want of relation between his feelings and constitutional symptoms ought also not to be too much relied upon; for, in hypochondriacs, the vascular system is not readily excited to febrile commotion, although the sensi-

bility is easily deranged and altered in a variety of situations, either successively or simultaneously. In every instance, there is the utmost necessity for patient investigation, and for the exertion of practical acumen. When the hypochondriac's sufferings are seated in the digestive organs, then a careful examination of the abdominal regions, and of the excretions, will generally indicate the extent of mischief, and show how much may be attributed to the patient's susceptibility or morbid sensibility; but when the complaints are referred to the head or heart, then the difficulty is greater; for we know that in these situations, structural changes may be slowly advancing, without inducing these physical signs and disorders of the functions of these organs, usually attendant upon more rapidly developed organic lesions.

16. The sufferings referred to the *digestive organs* have been imputed by Broussais and his followers to *gastro-enteritis*; and I believe that, in many cases, the circulation in the digestive mucous surface is more or less deranged: but this derangement is not identical with true inflammatory action. The organic sensibility and state of nervous influence in those parts are not the same in these complaints. In hypochondriasis, the patient can bear firm and prolonged pressure, although he may wince from a momentary or slight pressure, owing to his fears and morbid feelings. He generally has an unimpaired, or even a ravenous, appetite; is capable of using exercise, or even of undergoing fatigue, and is benefited by them. His bowels are usually constipated, and his appearance is not materially, if at all, affected; and febrile symptoms are not observed. Whereas, in *gastro-enteritis*, firm pressure is generally not endured, the appetite is impaired, as well as the looks, strength, flesh and general health; and the bowels are loose and irritable, altogether the converse of this is sometimes observed. The spongy condition of the gums, the falling of them from the teeth, and the flabby state of the sides of the tongue, frequently observed in hypochondriasis, indicate rather a deficiency of tone and of vital cohesion of the digestive mucous surface, than inflammatory action.

17. The symptoms referrible to the *head* are often such as to rouse the anxiety of the practitioner, especially when they are attended by disorder of any of the functions of sense. Yet I believe that these symptoms more frequently depend upon disordered circulation, as well as altered sensibility, than is supposed. In this complaint, the state of the cerebral circulation is too often neglected, or not inquired into; and the sufferings of the patient believed to be either exaggerated or imagined. When his strength and healthy appearance are unimpaired, and the functions of the senses are uninjured; and when the temperature of the scalp and the action of the carotids are not materially affected, we may safely conclude, that the morbid feelings in the head do not indicate that danger, which the fears of the patient would imply; and this inference will be the more conclusive, if the patient have never experienced any apoplectic, paralytic, or epileptic seizure; and if he has been known to be subject to nervousness, low spirits, or hypochondriacal feelings. In many cases, however, of this malady, particularly in the second or third grades of it, increased action of the carotids, heat of the scalp,

flushing of the countenance, suffusion of the eyes, &c., indicate cerebral plethora, or active congestion within the head, and sufficiently show that, although the sensations in this quarter may be exaggerated, they are by no means unreal.

18. The disorders referred to the *heart and lungs* are to be distinguished from such as are unequivocally organic, by attention to the physical signs. The palpitations and anxiety at the præcordia often complained of, are certainly chiefly nervous in their nature; but of this we have only negative proof. During the palpitation, a bellows-sound may be present, although it cannot be detected in the intervals. Yet I have known instances where it was at first heard only during the paroxysm of palpitation; but, after the lapse of a long period, it was heard more constantly. I believe that those distressing symptoms, although strictly nervous at early periods of the disease, either slowly or imperceptibly induce, or are attended from the beginning with, a slight and gradually increasing kind of organic lesion. Morbid states of the heart, as slow grades of inflammatory irritation, may exist, especially in the lining membrane of the cavities and large vessels, and occasion the distressing feelings complained of, although they may not be manifested by physical signs. When cough, and difficult or oppressed breathing, are present, their nervous sympathetic nature may be readily detected, by attention to their characters, by the absence of the appearance of expectoration, and by the sign furnished by auscultation and percussion.

19. Hypochondriasis has been often confounded with, or viewed as a variety of, *insanity*. It is important to discriminate between them. Dr. Pritchard's remarks on this subject evince the correct judgment of this able writer. He observes, that an hypochondriac is in full possession of his reason, though his sufferings are not so dangerous, or so severe as he supposes them to be; but if he declares that his head or his nose has become too large to pass through a doorway, or displays any other hallucination, he has become a lunatic; his disorder has changed its nature; and this conversion takes place occasionally, though by no means so frequently as supposed. Hypochondriacs, however low-spirited or dejected, also suffer differently from persons affected with *melancholy*. The apprehensions of the former are confined to their own feelings and bodily health. On other subjects, they converse cheerfully, rationally and justly. But melancholics view all things through a gloomy medium. They despond on all subjects, and are mentally miserable, and independently of any severe bodily suffering. The affections and sentiments of the hypochondriac, especially to his former friends or to his connections, are not in the unnatural, or perverted state, observed in all the forms of insanity.

20. VI. *Causes*.—i. *Predisposing circumstances*. Hypochondriasis may commence at any age; from 21 to 55 in males, and from 30 to 60 in females. It is more frequent and more severe in the former than in the latter sex. It seldom occurs in females until after 30 or 35, hysteria being the form which nervous affections usually assume in them in early life; but it often commences about or soon after the cessation of the menstrual discharge, although rarely in so severe a form as in the other sex. It affects every

temperament or habit of body; but somewhat oftener the nervous, the melancholic, the sanguine and the bilious; and persons who are subject to hæmorrhoids, to constipation of the bowels, and to disorder of the digestive functions, and who are of a sallow complexion. Hereditary influence, or peculiarity of constitution transmitted from the parents, has, perhaps, some influence in predisposing to it, as WILLIS, HOFFMANN, and others have contended, although not in so remarkable a manner as in some other nervous complaints. Employments which are sedentary, or prevent due exercise in the open air, and which, at the same time, admit of activity of mind, also predispose to this complaint. Hence the frequency of hypochondriasis in shoemakers and tailors. Mental exertion and fatigue, or prolonged or overstrained attention and devotion to a particular subject, especially in connection with full living relatively to the exercise taken in the open air, may be said to be the chief sources of predisposition amongst the educated classes. Owing to these circumstances, this has been termed the disorder of literary men; but whoever is engaged in active mental pursuits, or in departments of business requiring great intellectual exertion, or occasioning anxiety of mind, is equally liable to it. Dr. PRICHARD observes, that agricultural labourers, who spend a great portion of their time in any employment in the country, are frequently the subjects of this complaint. Although sedentary employment is likely to dispose the mind to brood over the evils that afflict it, yet much is probably also owing to the diet of field labourers, and to the influence of humidity and exhalations from the soil to which they are exposed, particularly in the reparation of ditches and hedges. The effect of climate in predisposing to hypochondriasis is not very manifest; but situations which are humid, and productive of terrestrial emanations, are apparently not without some influence in the production of it.

21. ii. *The exciting causes* may be divided into (a) those which act more immediately upon the mind, and consecutively, or through the medium of the mind, upon the organic functions; and (b) those which affect primarily those functions, and secondarily the mental energies. — a. Whatever exhausts, or directly depresses cerebral power, as intense application of the mind to difficult or abstract subjects, anxieties respecting schemes, speculations, or objects of ambition; disappointments, sorrow, fright, or sudden alarm; the depressing passions, severe losses of fortune or friends, indulgence of sombre or sad feelings; devotion to music and the fine arts, reading medical books, &c., and whatever favours congestion of the brain, as indulgences in bed, the use of narcotics, particularly opium, &c., may occasion this complaint.

22. b. The causes which act primarily upon the organic nervous system, and functions of the organic viscera are very diversified. Whatever impairs the energy of the system, as the too frequent or too liberal use of calomel as a purgative, or of other mercurials; poor, or innutritious diet, or the excessive use of tea and slops; a humid, close, impure, or miasmatic air, &c., may produce hypochondriasis. Mercurial purgatives, although often serviceable by promoting the discharge of bile, and giving relief for a time, yet

often increase the nervous depression and morbid sensibility, when frequently resorted to, and induce or aggravate this complaint. Of the origin of hypochondriasis in an improper recourse to calomel, I have seen several instances. Whatever inordinately excites, or directly relaxes, the digestive mucous surface, as acrid cathartics, often exhibited, &c.; whatever occasions or perpetuates indigestion, or impedes the functions of secretion and excretion; and whatever occasions plethora of the vascular system generally, or of the portal or cerebral vessels in particular, especially overloading the digestive organs by too large meals, or by too-rich or full living, the inordinate use of animal food, of malt liquors, wine, &c.; insufficient exercise, and inattention to the several excreting functions, may give rise to hypochondriasis. Whatever induces torpor, or perpetuates inaction of the depurating organs, whilst the organs of supply are stimulated to increased activity, will occasion redundancy of noxious elements, or of the ultimate products of animalisation, in the blood, and will, sooner or later, especially in connection with vascular plethora, give rise to this complaint, or to some other, depending, equally with it, upon oppletion of the vascular system. Persons who have been accustomed to active occupation, both physical and mental, or to much exercise in the open air, upon retiring from business with a competency, and when hoping to enjoy the fruits of industry, are often overtaken by this complaint, particularly if they live fully, and in a comparative state of ease and indolence. The vascular system, which was formerly preserved in a state of fulness, in due relation to nervous power, by the healthy action the different emunctories, now becomes overloaded, particularly the portal vessels. The cerebral circulation also becomes oppressed, and the mental energy impaired.

23. c. Some of the causes act by weakening both the organic nervous influence and the mind. The most injurious of these are premature and excessive sexual indulgences, particularly masturbation. Whenever hypochondriasis appears early in life, this should be dreaded as having been the chief cause. Many of the depressing passions, and anxiety of mind, act in a similar manner. As the early addiction to vicious habits, as well as several others of the exciting causes, is more or less frequent in all classes of the community, it cannot be said that the effect is confined to any particular class. Indeed, hypochondriasis is often met with in the lower orders, although not so frequently as in those whose minds are most highly cultivated, whose sensibilities are thereby rendered acute, and who are either precluded from, or not obliged to take, that exercise which is necessary to prevent general, local, or excrementitious plethora.

24. VII. PATHOLOGY. The ancients appear to have observed this complaint chiefly amongst philosophers, poets, and others endowed with the most acute sensibility, and the most vivid imagination; and to have either confounded it with, or viewed it as a variety of, melancholy. ARISTOTLE says, that all the great men of his time were melancholic, that is, hypochondriac. HIPPOCRATES, ARISTOTUS, and others, attribute the complaint to an excess of black bile. DIOSCORIDES refers it to the stomach, and GALEN considers it as a variety of melancholy, having its origin in this

organ. However much the ancients and older writers differ, as to whether it should be considered as a dyspeptic, or as a mental affection; they appear not to view it as connected with hysteria. SYDENHAM, however, describes hypochondriasis and hysteria as the same affection; without taking into account the chronic inflammations, obstructions, or lesions of structure so often associated with the former, and refers them to deficiency or irregularity of the animal spirits,—of the cerebro-spinal nervous influence, in the language of modern pathology. WILLIS considers it as a nervous complaint, seated in the brain; and ZACUTUS LUSITANUS, as an affection of the stomach and liver, depending upon coldness of the former and increased heat of the latter. BOERHAAVE thinks that it depends upon a viscid matter engorging the vessels of the organs seated in the hypochondria, as the liver, the spleen, stomach, pancreas, and the mesentery. STAHL and his followers suppose it to arise from efforts to establish a critical hæmorrhage; LOWEN, from a morbid disposition in the mass of blood; and HOFFMANN, from too great a tension of the nervous system, sometimes in connection with inflammation of the digestive mucous membrane. From the time of HOFFMANN until that of CULLEN, various modifications and absurd combinations of the preceding opinions have been advanced. CULLEN observes, that this disorder occurs chiefly in persons of a melancholic temperament; that it consists of an affection of the mind, conjoined with dyspepsia, and is the result of a weak and mobile state of the nervous power. The opinions of CRICHTON and GOOD are deficient in precision and accuracy; they have confounded with hypochondriasis affections entirely distinct from it and from one another. LOUVER-VILLERMAY has formed more correct views of its nature and relations than most modern authors. He concludes that it is seated in the abdominal viscera, particularly in the stomach, and that these are affected in their nervous system or their vital properties, and especially in their organic sensibility. He conceives the disorder to consist in an alteration of the vital properties of the nerves of digestion, and an exalted state of organic sensibility, of which these nerves are the special conductors and receptacles. At the same time, he admits that the general sensibility and the cerebral functions become consecutively affected. This opinion is essentially the same as that of BICHAT; and it has been adopted by the author, and, more recently, by M. BRACHET and Dr. GULLY. M. BROUSSAIS contends that hypochondriasis is not merely a nervous affection, but that it is a result of chronic inflammation of the digestive mucous membrane; the morbid sensibility distinguishing it arising from the peculiar condition of this membrane, as respects its vascularity; and that the various ailments of which the hypochondriac complains proceeds from sympathy with this part of the digestive canal.

26. M. GEORGEY argues, on the contrary, that the disease is primarily seated in the brain; that it is characterised by disorder of the functions of this part, unaccompanied by fever, or convulsive motion, or any manifest derangement of reason or judgment, and he adduces the following circumstances in support of his argument. 1. That the chief exciting causes of the disease exert their

influence directly on the functions of the brain. 2. That the characteristic symptoms are referrible to the head. 3. That other symptoms observed in the complaint are not constant, some belonging to one organ, and others to another, whilst the digestive functions are occasionally not disordered. 4. That moral treatment is the most efficacious in the complaint.—There are several fallacies in the above inferences: It by no means follows, that, because certain occurrences make their first impression on the mind, the brain should be either principally or primarily affected by them. The depressing passions, however excited, produce a much more remarkable effect upon the functions, and even upon the organisation, of the heart, the stomach, the liver, &c., than upon the brain itself, unless indeed this last organ has previously been in a state of disease. The early symptoms, also, of hypochondriasis, are certainly not so referrible to the brain, as to the digestive and other organs, supplied by the ganglial class of nerves; and moral treatment is not always the most successful, or that which should be alone put in practice: it more generally constitutes only a part of a general plan.

26. Dr. PRICHARD observes that, when we take into consideration the mental dejection of hypochondriacs, the habitual state of their spirits, and the trains of morbid or painful sensations which torment them, we must admit that the deviation from the healthy state of the cerebral functions lies at the foundation of their ailment, though it is remote from organic disease, and of a kind of which we can form no conception. Many of the phenomena, he allows, would lead to the opinion, that the principal deviation from the natural state of functions, is seated in the nervous system of physical or organic life; but, phenomena involving consciousness and affections of mind, can hardly be confined to this part of the nervous system. Dr. PRICHARD, however, overlooks the fact, that the brain itself is as much supplied with the organic nervous system, as any other internal organ, and consequently that it will manifest disorder, whenever this part of the nervous system is seriously affected; and that this disorder will present similar characters as to kind,—as to depression, perversion, activity or exaltation—to those displayed by other organs influenced by this system. The complaint, it is admitted, commences, or is first manifested, in the digestive viscera; and, it is not until the organic nervous system evinces great depression throughout the abdominal organs, that the functions of the brain become also manifestly depressed or impaired, and then the depression observed in the energies of these functions is similar in kind to that remarked in the digestive, secreting, and excreting actions;—these latter are performed slowly and imperfectly,—intellectual power, attention and application are also weakened. The sensibility of the organic nervous system, is morbidly acute in all or several of the viscera,—the cerebro-spinal system, and the dependent organs of sense and volition, are also morbidly susceptible, and incapable of the energetic exercise of their functions. The organic actions are performed with obscure sensations of distress, difficulty or anxiety,—the mental operations are attended by fear, distrust, and anxious bodings. The vital manifestations throughout the economy

are languid and relaxed, and the resistance opposed by life to morbid impressions remarkably weakened, — the faculties of the mind are equally languid, and the tone of the cerebro-spinal nervous system altogether depressed. Dr. PRICHARD supposes, that the occasional suspension of the complaint, for longer or shorter intervals of time, militates against the opinion, that the disease is owing to the state of the organic, nervous, and digestive functions; but this part of the nervous system is as likely to experience remissions and exacerbations of disorder as the brain and its dependencies. At the commencement, the affection of the organic or ganglionic nervous system is confined chiefly to the digestive and excreting organs; but at a more advanced stage, it is extended to the brain, where it occasions the dejection of spirits, the fears, and the anxieties connected with the patient's feelings and ailments, characterising the fully developed complaint.

27. My views will be partly apparent from what has been now advanced. But, although the organic nervous system is evidently primarily and chiefly affected in hypochondriasis, and although the brain thus becomes, consecutively implicated, other morbid conditions are also superinduced, and are more or less concerned in the aggravation or perpetuation of the patient's feelings and sufferings. Imperfect excretion combined with the supply of nourishment induces either absolute or relative plethora, as well as a morbid condition of the circulating fluids, owing to the accumulation of noxious matters—alimentary, saline, and animal—products of animalisation, which have not been eliminated from the blood. The chief vital organs thus become loaded and oppressed; and the nervous system and brain are rendered morbidly susceptible by the quality of the blood circulating in them. From considerable experience and close observation of the circumstances connected with the pathology and treatment of this complaint, I am firmly persuaded that these views constitute the only basis of a successful method of cure.

28. VIII. — PROGNOSIS. It is often extremely difficult to form an opinion, as to the presence of danger in this complaint. Even where the sufferings have been most distressing, the patient's life has apparently not been materially shortened thereby; and where they have been much slighter, death has occurred unexpectedly, and whilst the symptoms did not seem to indicate its approach. This may have been owing in part to the want of discrimination on the part of the practitioner, in not detecting organic lesion in the heart, brain, or other viscera. There can be no doubt, that many cases of obscure structural change in either of these organs, or in any other part, were formerly considered as hypochondriasis, and most injudiciously treated as such. Many of these would have been detected by the improved diagnosis of the present day, and thus the number of instances of the disease would have been diminished. Yet nevertheless, the existence of this complaint, or, in other words, of an affection of the functions and sensibility of the organic, and cerebro-spinal nervous systems, sometimes associated with, and heightened by, structural lesions, cannot be doubted; although M. FOVILLE has contended that it should not be considered as anything else than organic change in persons of acute sensi-

bility; that both it, hysteria, irregular gout, and disorders of the fluids, belong to the same category; and that to one or other of these, the ignorant part of the profession refer those complaints, the true seats and natures of which they are unable to detect,—that, in short, they are names under which all others but the morbid anatomists conceal their ignorance. Now it may be stated without much fear of injustice, that those who see nothing in disease, but what is demonstrable after death, and who believe in nothing pathological, which is not material and palpable, will very often arrive at wrong conclusions, as to the origin, nature, course, and treatment of the most important maladies of our species.

29. The *Prognosis*, however, relates more to the probable recovery of the patient than to any danger more or less immediately attending it. (Of the existence of danger, the signs of organic change will be the chief harbingers, and upon the detection of these, and upon the inferences formed as to the seat and nature of existing lesion, the opinion will necessarily depend. — *a*. The circumstances, which may be considered as unfavourable to the patient's complete recovery, are not always very manifest or readily ascertained; but, if the causes are not removable, or chiefly of a moral kind, — if the disease is confirmed, or if the patient has had repeated attacks, — if it has supervened upon the suppression of the hæmorrhoidal flux, and is not removed by the restoration of this evacuation, or upon the disappearance of the catamenia at the usual period, — if sleep is not obtained without recourse to narcotics, — if the imagination is powerfully affected, and constantly influenced by moral causes, the physical indications of disease being slight, — if the nervous affection is associated with serious disorder, or with signs of structural change of some important viscus or with some mental delusion, — and if the patient indicates much suffering in his appearance, or the melancholic temperament, or a cachectic habit of body, — we may expect to alleviate, but we can hardly hope to remove, the malady, although the removal of it may be accomplished.

b. A more favourable opinion may be entertained, if the chief ascertained causes are removable; if the disease is recent, or only in the first or second stage; if the patient is of a sanguine temperament; if the circumstances or profession of the patient admit of exercise, or salutary employment of mind or body, and of travelling, or repeated change of air during the treatment; if he enjoys his nightly repose, and possesses his usual or natural looks; if the test of BAGLIVIO — “In chronicis morbis si facies naturalis sit, ac boni coloris, nunquam crede adesse obstructions, aliaque vitia in visceribus” — is applicable, and if the unfavourable circumstances enumerated above are not present. — Hypochondriasis has been removed by the supervention of other diseases, as diarrhoea, dysentery, fever, jaundice, dropsy, &c.

30. IX. — TREATMENT. Hypochondriasis would be more frequently cured, if stricter attention were paid to the removal of the circumstances in which it originated, and to the combination of physical and moral treatment appropriately to the pathological states just considered. But the disease is generally advanced or confirmed, before proper medical advice is resorted to, — the patient has been for some time exciting his imagination,

and aggravating his morbid sensations by reading medical works, which might mystify but could not instruct him as to his ailments, and dabbling in physic, which might confirm, but could rarely relieve, his complaints;—he fails in his own efforts, and then, if he have recourse to a duly qualified adviser, he expects, and is impatient if he does not derive, immediate benefit. Many hypochondriacs also adopt neither the restricted diet, nor the regimen prescribed for them; and thus the treatment fails more from the fault of the patient, than from the means employed.

31. i. *The first indication, in the treatment of hypochondriasis, is to remove the remote causes, the habits, circumstances, and moral influences, to which the patient has been, or is subjected. The diet should be restricted, and regulated with reference to the patient's habits, occupations, and daily amount of exercise; and he ought to be engaged, as much as possible, with objects calculated to interest, but not to fatigue, the mind. With the affluent this is a matter of difficulty, and is often only to be accomplished by travelling. In the good old monkish days, pilgrimages to the shrines of saints were recommended for the benefit both of soul and body; but in modern times, since these have become divided cures, saintly interference has been but little confided in, and the purifying operation of mineral springs has alone been considered efficacious. And, certainly, the good effects resulting from faith in either, or in both these agents, have neither been few nor equivocal. The shrewd practitioner, who plants himself by the side of a saline or chalybeate mineral spring, or any other spring possessing deobstruent and tonic properties, and situated in a dry and salubrious air, if he succeed in attracting hypochondriacs to his Hygieian temple, by the usual direct or indirect means, will generally relieve many of the more faithful of his worshippers. The lawyer, the merchant, the stockbroker, and others, who have weakened their digestive organs, exhausted their nervous systems, and over-excited or tortured their brains, by application to business, by the vicissitudes of affairs, and the anxieties which are consequent thereon, when induced to visit a watering place, will frequently derive benefit from the moral and physical changes thereby occasioned. Instead of over-exciting or distracting the mind with business, of overloading, and perhaps over-stimulating the digestive organs, of allowing the liver and bowels to become torpid, of neglecting due exercise in the open air, and of respiring the impure atmosphere of a crowded city or manufacturing town, the hypochondriac is properly directed to relinquish the anxieties of affairs, to conform to a limited diet, to keep his bowels very freely open, to walk and ride a certain number of miles daily at prescribed times, and to drink the waters, whether aperient, deobstruent, or chalybeate. The result cannot be doubtful in many cases. The entire removal of the causes of disorder, the exercise, the change to a purer air—the thorough alteration of habits, of circumstances, and of atmosphere—all combine to produce benefit; and the physician, as well as the spring, obtains a credit, to which the amount of merit really possessed by either by no means entitles them, and which is often heightened by the circumstance of advice previously given to the patient—whilst he is immersed in business and dis-*

tracted by anxieties, when precluded from exercise and amusement, and when constantly subjected to the combined operation of the causes of the malady—having failed in accomplishing what was probably most judiciously attempted, but which he was counteracting in the most efficient manner in his power.

32. *The best means of fulfilling this indication is by travelling, and by due attention to the diet, and to the excreting functions. Continued residence at a single watering place is not nearly so beneficial as travelling, unless much exercise be daily taken. Travelling, aided by mineral waters suited to the peculiarities of the case, has the best effect; and, next to this plan, judicious medical treatment, pursued at the same time with change of air and scene. The very incidents connected with travelling, as Dr. PUGHAN remarks, abstract the patient's attention from his feelings and sufferings; and, even the temporary disorders that may occur, as rheumatism, cold, and diarrhoea, produce this effect in a still more remarkable manner. When mineral waters are resorted to, either alone, or in connection with travelling, those which are aperient and deobstruent should be first used, as the waters of Seidschutz, or Pullna, or Chellenham, or Harrogate, &c.; and subsequently those of Bath, Carlsbad, or Marienbad, Pyrmont, or Tunbridge, &c. The springs of Schwalbach and Pyrmont were much extolled by HOFMANN; those of Eger and Marienbad by HEISTER and HUFELAND; and the waters of Pyrmont and Seltzer, by MARCARD. The baths of Wiesbaden have also been praised by RITTER and others. During a course of Chalybeate waters, the bowels ought to be kept moderately open, either by aperient medicines, or by the more aperient or purgative waters. Exercise of all kinds is more or less beneficial; but that on horseback, or on foot, or both, is perhaps preferable. The former was much praised by SYDENHAM and FULCRON, but, whatever kind of exercise be adopted, it is necessary to regulate the bowels, to promote the functions of the emunctories, to remove the patient from the pursuits, anxieties, and circumstances, which induced the complaint, or to change his habits, and to amuse and interest his mind.*

33. ii. *The second indication is to evacuate morbid secretions and accumulated excretions, to correct the morbid states of the digestive canal, and of the organs immediately connected with it, and to relieve the more distressing feelings of the patient. It is indispensable to the obtaining of the confidence of the patient, and, consequently to the successful management of his case, that his various ailments should be attentively heard and patiently investigated; that they should be altogether viewed as real, and that the treatment should be prescribed for him with clearness and with decision. However much the practitioner may doubt as to the origin or nature of the complaint, and however much he may despair of the efficacy of the means prescribed, he should conceal his doubts, treat the sufferings and feelings of the patient with sympathy, and arrange and combine the means of cure into a method at once consistent and appropriate, which is to be faithfully pursued in all its parts. Confidence will be thus inspired, without which he will neither derive benefit nor continue under treatment.*

34. a. The propriety of having recourse to *mild* or *stomachic* purgatives, when the bowels are sluggish or torpid, or the stools offensive, cannot be questioned. Yet, in some cases, the *gastro-intestinal mucous surface* may be in such a state of irritation or of chronic inflammation, as to require these to be prescribed with caution, and selected with judgment. When this state of the digestive mucous surface is present, *leeches* should be applied to the abdomen, or to the anus: *refrigerants* should also be given with *muclilaginous* or *emollient medicines*, (F. 355. 431. 436. 821. 837. 865.) and the functions of the skin promoted by the *warm* or *vapour bath*. If the patient be plethoric, a moderate *venesection* or *cupping* on the nape of the neck, or a repetition of leeches to the epigastrium or anus, will be of service. Although irritating purgatives are hurtful in this description of cases, yet those of a mild or of a cooling kind ought not to be withheld; and their operation may be promoted by enemata. The tartrate or sulphate of potash, the carbonate of soda or magnesia with rhubarb, either in powder or infusion; or the phosphate of soda, or the tartrate of potash and soda, may be given with other substances, (F. 440, 441, 868.) according to the peculiarities of the case. The *diet* should be rejected chiefly to muclilaginous or farinaceous *icles*, and the beverages consist of simple saline *ing fluids*.

34. b. In other cases, particularly where the digestive mucous surface is deficient in tone, and when the states of the epigastrium, of the pulse, and of the tongue do not indicate inflammatory irritation, *purgatives* or *aperients* of a warmer or more stomachic kind than the above may be prescribed. The infusion of senna, or that of rhubarb, may be given with the infusion of gentian or of columba, or of cinchona, or of cascarrilla, and an aromatic or carminative tincture and a neutral salt: or the aperients directed above (§ 34.) may be taken in mint-water. In many cases the compound *guthanum pill*, or *assaftida*, may be conjoined with the purified *extract of aloes*, or with *rhubarb*, and the inspissated *ox-gall* (See F. 547, 548. 558—563. 572—576.), either at night, or *why* with dinner. I have found the following excellent in hypochondriasis with a torpid state of the large bowels.

No. 259. R. Pulv. Rhei ʒss.; Pulv. Ipecacuanhæ, Pulv. Capsici, aa gr. vi.; Extr. Aloes purif. ʒj.; Extr. Fellis Tauri ʒss.; Saponis duri, gr. xij.; Olei Carui, q. s. Contunde bene, et divide in Pilulas xxx., quarum capiat unam vel duas quotidie cum prandia.

No. 260. R. Extr. Fellis Tauri, Massæ Pilul. Galb. Comp. aa ʒss.; Extr. Aloes purif. ʒj.; Saponis duri, gr. x.; Pulv. Ipecacuanhæ, gr. viij. M. Fiant Pilule xxx. Capiat unam vel duas, ut supra.

36. The use of *laxatives* in hypochondriasis was much insisted on by RENOUART and LEBLANC, and various substances belonging to this class were recommended: but they require no very particular remark at this place. *Magnesia*, especially the calcined, is well deserving of adoption, when the complaint is attended by a copious deposit of salts in the urine, or by a gouty diathesis. It also relieves the flatulence and distension of the epigastrium and hypochondria more certainly than any other aperient. When there is no gastro-intestinal irritation, or if this be slight only, it may be given in mint-water, or in any tonic, stomachic, or aromatic vehicle. Precipitated sulphur was much

praised by BISSET, and is certainly an appropriate laxative, particularly as the use of it for some time increases all the excretions, and especially those from the skin, bowels and liver.

37. b. Many of the distressing feelings of the patient are referrible to irritation in some part of the digestive mucous membrane. This irritation may exist in the rectum in connection with hæmorrhoids, or in the cæcum, or in any other part of the canal: but these two are amongst its most common seats. In such cases, it is propagated by the communicating ramifications of the ganglial nerves to the roots of the spinal nerves, or to the spinal chord, and sensibly expressed in some remote part by *reflex sympathy*, as stated in my notes to RICHFRAND's *Elements of Physiology* (p. 34. Lond. 1824. 2d ed. 1829.). The hæmorrhoidal discharge has been considered favourable in hypochondriasis by ALBERTI, GRANT and others; but, as already stated (§ 6.), it indicates either general or local plethora, when it has not been induced by costiveness or by acrid purgatives, and points to restricted diet. When the hæmorrhoids are not attended by any discharge, they furnish the same indications and show that, in addition to low diet, general or local bloodletting should be prescribed. Without these, the removal of the hæmorrhoidal affection may not be entirely devoid of risk to the hypochondriac, especially if regular exercise in the open air be not taken.

38. c. Simple *lavemens* or *enemata* have been too generally neglected in the treatment of this complaint. The researches of PINEL, ANNESLEY, and of the author, show that the large bowels are not only disordered in their functions, but also often altered in structure, or even displaced in the more severe and chronic cases. The depressed state of organic nervous energy, occasioning hypochondriasis, permits fecal and flatulent accumulations to form in the cæcum, colon and rectum (see these articles), causing inordinate distensions of portions of the canal with spasmodic constriction of adjoining parts. Owing to the fecal collections, to the efforts of one part of the bowel to propel its contents through a torpid or an obstructed portion, and to the frequent recurrence of these states, displacement of portions of the colon, and even partially of the cæcum, are not rare. Inordinate dilatation of the latter viscus is also sometimes observed. But I have remarked, in several cases of hypochondriasis complicated with hæmorrhoids, or with spasmodic stricture of the sphincter ani, or with fissure or some other source of irritation in the anus, a remarkable dilatation of the rectum within the sphincter. In these instances, the dilatation amounted to a sacculated state. This had evidently proceeded from inordinate accumulation of feces, owing to the obstacle to their discharge, caused by internal hæmorrhoids or by spasm of the sphincter. One of these had been treated for stricture of the rectum, and a bougie frequently passed; but it seldom found its way into the portion of the bowel above the dilatation. The intestine was injured by this officious interference; peritonitis supervened; and near the fatal termination of the case I was consulted. Inspection after death furnished a striking example of this dilated state of the rectum, as well as of the effects of a species of interference generally quite unnecessary, although so frequently practised at the present day by a few

surgeons, as to render it disgusting, particularly as it is warranted neither by the history and nature of the case, nor by sound therapeutical views.

39. In the early stages of hypochondriasis, especially, and as a means of preventing costiveness and the above, as well as other consequences of this state, *enemata* of various kinds, according to the peculiarities of the case, ought to be frequently employed. Simple water, tepid or cold; emollient, oleaginous, or saponaceous fluids, and various saline solutions, will be thus administered with benefit, and will not only promote the action of the aperients just mentioned, but, when daily used, will establish a regular state of fecal excretion. (See the *Formula for Enemata* in the *Appendix*.)

40. *d.* Whenever the complaint is connected with vascular *plethora*, or is consequent upon the suppression or disappearance of some accustomed evacuation, and when it has been fully developed, an oppressed or congested state of brain may exist. But whatever may be the state of circulation in the capillaries or sinuses of this organ, there can be no doubt of the propriety of a moderate depletion, by cupping on the nape of the neck, in these cases. I have prescribed it in several instances with marked benefit; and in one gentleman I carried the depletion to thirty ounces at a single operation with the greatest advantage. Many of the patient's distressing feelings depend upon the superinduced disorder of the circulation in the brain, particularly those which are referred to the head, and to the organs of sense and volition. In some cases, however, of this description, blood should be abstracted with caution, and it will sometimes be necessary to promote nervous energy and tone, even whilst we have recourse to depletions and evacuations. Whenever the hypochondriac has increased heat of scalp with a firm pulse, these latter may be safely prescribed in moderation, and may be aided by cold-sponging the head night and morning, or by daily recourse to the cold *douche* or *shower-bath*. The extremities, especially the feet, of this class of patients are generally cold; this circumstance should receive due attention. When the sufferings are referable to the brain it will be useless, and indeed sometimes injurious, to attempt to alleviate or suppress them by powerful narcotics. Even when these give temporary relief, more permanent mischief is often occasioned. The means already noticed, both regimenal and medicinal, will be much more efficacious; and, if these fail, when pushed sufficiently far, organic lesions probably exist, for which setons, issues, &c. may be tried, although with but slight prospect of advantage.

41. *e.* If the complaint is associated with *palliations* or *irregular action of the heart*, or with a *dry nervous cough*, much benefit will result from *camphor*, conjoined with *narcotics*, and sometimes, also, with *refrigerants* and *demulcents*. A weak decoction of *Senega*, with orange-flower water, or with any other aromatic and demulcent fluid, and with small doses of *prussic acid*, or of some other anodyne, will often, also, be of service. If the liver be congested, or otherwise disordered, the treatment should be modified accordingly. The majority of cases of this kind, particularly if the patient have lived fully or taken little exercise, will bear *depletion*, especially cupping on the right hypochondrium, or below the right shoulder,

or the application of leeches to the anus. A dose of *calomel*, or of *Plummer's pill*, or of blue pill, may also be prescribed; but it should either be conjoined with an aromatic, or some purgative, or be followed, in a few hours, by a stomachic aperient. Hypochondriacs are generally very susceptible of the specific action of mercurials, and their mental depression and nervous sensibility are much increased by them: yet, with due caution, and if not often resorted to, they are beneficial, when the functions of the liver are impaired. The supertartrate of potash, the preparation of *Taraxacum*, and the carbonates of the *alkalies*, with stomachic purgatives, are also of great service in a torpid state of this organ. When, in connection with this, or with a morbid state of the biliary and other abdominal secretions, the hypochondriac complains much of *colicky pains*, with costiveness, flatulence, distension, &c., these, and the mild purgatives already mentioned, calcined *magnesia*, with antispasmodics or carminatives, or with small doses of *ipecacuanha* and *hyoscyamus*, should be steadily employed for some time, and be aided by emollient diluents, by *demulcents*, and by *saponaceous* or *oleaginous enemata*. Castile soap may also be conjoined with the other substances, given in the form of pill.

42. *iii.* The third intention is to restore the energy and healthy functions of the organic, nervous, and cerebral organs. — Tonics have been commonly prescribed prematurely in hypochondriasis, or when the digestive mucous surface, the brain, or the liver, has not been in a state to derive benefit from them. They are even prejudicial in most of the circumstances which have now been considered, unless in combination with purgatives, especially when these parts are in a state of irritation or congestion, and until this be removed, they may even aggravate the complaint. But when the excretions have been duly promoted, appropriate evacuations procured, and visceral congestion removed, a judicious recourse to them is often of great service. During a course of tonics, the bowels should be kept regularly open, and local irritation or determination of blood prevented or removed, should either appear. The *Chalybeate mineral springs*, already mentioned (§ 32.), are especially beneficial when tonics are indicated. The preparations of Iron, particularly the sulphate, the ammonio-chloride, the potassio-tartrate, and the sesquioxide, may be substituted, with advantage, for mineral waters; but if they occasion fever or headache, they will generally be injurious, unless conjoined with saline refrigerants. If *gastrodynia* is complained of, the tonics may be given with anodynes or narcotics, as the *Hydrocyanic acid*, *Hyoscyamus*, the compound tincture of *camphor*, &c., or with the carbonates of the *alkalies*; — the *Tris-nitrate of bismuth* may be prescribed in similar combinations. Where there is a tendency to plethora, tonics, and especially chalybeates, should not be employed, without attention be paid to exercise and diet. When tonics prove too heating, the bitter infusions or decoctions may be prescribed, with small doses of *Nitre*, or of the *Hydro-chlorate of Ammonia*.

43. When Hypochondriasis seems consequent upon venereal excesses, or upon solitary indulgences, or when the sexual appetite is increased, as is sometimes the case, tonics are more especially

indicated, and may be prescribed from the first, if the bowels be kept regularly open. In such circumstances, vascular depletion* is contra-indicated, and evacuations of any kind ought to be cautiously practised. The chalybeate mineral waters, soda water, or other waters containing fixed air; the vegetable tonics, with soda; the tincture of the sesquichloride of iron, taken in camphor mixture, &c., are most appropriate in such cases, aided by early rising, and exercise in the open air.

44. iv. A *Fourth Indication* has been advised by some writers, viz. to restore to its proper seat or form any other complaint, upon the removal or spontaneous cessation of which, the hypochondriacal affection had supervened. This intention, however, cannot be often fulfilled, for a herpetic eruption may not be restored, although an artificial eruption may be easily produced. The restoration of an hæmorrhoidal flux is more readily procured; but a judicious recourse to local depletions, and to suitable diet and regimen, will be still more beneficial. The development of the gouty paroxysm, when hypochondriasis follows the disappearance of gout, has likewise been advised; but attempts to accomplish this do not always succeed: they may even aggravate the complaint. The means just mentioned will sometimes prove so serviceable, to render such attempts unnecessary; and yet have seen instances in which these means have failed, and for which I have been obliged to recommend a more liberal diet and regimen, with change of air, travelling, &c. When hypochondriasis follows periodic fevers, this indication is entirely out of the question. In these cases, as well as in those produced by malaria, humidity, &c., the chylopoietic viscera are generally in fault, and require, especially the biliary organs, strict attention. If this complaint is consequent upon suppressed discharges from the uterus, or is even associated with an increase of the natural evacuation, or with a morbid secretion from this organ, particularly about the change of life, organic change in the uterus may be the cause of the nervous disorder; but the restoration of the discharge in the one case, or the removal of the morbid secretion in the other, will have but little effect, either upon the lesion of the uterus, or upon this affection. The nature of this lesion, and the states of the vascular system, and of the digestive viscera, will require the chief attention in these circumstances.

45. v. *Remedies and Modes of Practice advised by authors.* — a. *General bloodletting* has hardly been noticed by any of the numerous writers on hypochondriasis; and *local depletions* have been directed by few excepting to the anus, in order to remove hæmorrhoids, or hepatic fulness. M. BROUSSAIS and Dr. GUTLEY, however, recommend leeches to be applied to the epigastrium on account of inflammatory irritation in the digestive mucous membrane, which they consider to exist in most cases of this complaint; and which no doubt forms a part of the pathological states in many cases. In these, an *antiphlogistic regimen* is always requisite, although too frequently neglected by both patients and practitioner.

46. b. *Aperients and laxatives* are generally serviceable when judiciously selected; but acrid purgatives are often injurious, although not to the extent believed by BROUSSAIS and his followers, unless they be frequently prescribed. My

objections to mercurial purgatives (§ 41.) in hypochondriasis are not altered by what has been advanced by WINTRINGHAM, RIEFF, CURRY, and others, in their favour. At the commencement of this century, a calomel epidemic prevailed in British practice, and this medicine was prescribed very generally, and very often injuriously, in this and many other complaints. The repeated doses of it directed by the late Dr. CURRY, not unfrequently aggravated the disorder, or converted it into melancholia. The much milder means, however, recommended by the late Mr. ABERNETHY, namely, an occasional blue-pill at bed-time, and a stomachic aperient in the morning, were often of great benefit, and were rarely attended by any inconvenience.

47. b. The propriety of prescribing *narcotics* and *anodynes* in hypochondriasis has been much discussed. Circumstances often arise to require a prudent recourse to them, and others appear which contra-indicate them. Some of them, particularly *opium*, afford temporary relief, and yet are injurious if largely or frequently employed. — *Opium* was recommended by TRALLER (*De Usu Opii*, s. iii. p. 35.), DRUIDEN (*Consult. et Obs.* t. i.), and others, and by THIERNIUS in conjunction with the mineral acids. Dr. CULLEN considered it injurious. Hypochondriacs often resort, and readily become addicted, to it; but, unless when under its influence, all their distressing feelings are aggravated by it. Even when used in moderation, it is relinquished with difficulty. I have met with several instances of hypochondriasis, presenting in some a hysterical character, as in females, and in others, the melancholic, in which opiates had been prescribed occasionally for severe or painful symptoms, and in which calomel had been given as an aperient; and in these the patients afterwards had resorted to the same means without medical advice, until the former was regularly taken in excessive doses, every three or four hours, and the latter every second or third night. In two cases, where the acetate of morphia, and in one, where the muriate had been prescribed, these substances were long afterwards continued three or four times in the day, on account of their effects upon the spirits, and gradually increased to one or two grains each dose. In neither of these was there any organic disease detected upon the strictest examination, although there was much functional disorder of the digestive organs. The strength and healthy looks of these patients are now almost restored, by reducing very gradually the dose of the narcotic: by relinquishing calomel, and by enforcing the practice recommended in this article. Yet I fear that the opiate will never be entirely given up, and that the dose of it will even be increased hereafter. In such circumstances no patient can be trusted. The practitioner, in order to overcome this noxious habit, may try the effect of varying the narcotic, of adulterating it, or of combining it with tonics, aromatics, &c.; of diverting the mind by amusement or travel, and of rousing the vital energies by early rising, exercise, tonics, and light diet. Persons who have habituated themselves to opiates will, however, rarely tolerate any other narcotic. I have prescribed for them *hyoscyamus*, *belladonna*, and *conium*. The first and last of these were too weak: the second seemed for a while to answer, but was soon relinquished. These, however, are

often beneficial in this complaint, especially in certain of its complications, in conjunction with camphor or other anti-spasmodics, or with purgatives, stomachics, &c.; or with tonics or carminatives, according to the numerous modifications it assumes. The *hydrocyanic acid* is also very serviceable in similar circumstances and combinations, to those in which narcotics are indicated. THULENIUS and WUNZEN recommended the laurel water in this complaint long before the discovery of its active principle.

48. *c. Tonics* of various kinds have been prescribed in order to rouse the nervous energy: but they require much discrimination for the reasons already stated (§ 42.). As congestions and obstructions of important viscera also should be removed, they ought to follow, or to be conjoined with, means calculated to fulfil this intention, and selected with due reference to it. On this account the preference given to *chalybeate mineral waters*, by ZACUTUS LUSITANUS, DRLLINCOURT, HOFFMANN, and others, especially those springs which contain deobstruent and aperient salts, along with the iron, is fully justified. I have seen the *arsenical solution* given in some instances, but it is a precarious medicine in this complaint, — it may be even hazardous, and it is not justified even by the circumstances of the affection having followed periodic fever. I have rarely seen any benefit result from even a moderate use of *wine*. It may afford a temporary relief, but it is most frequently injurious, by increasing vascular plethora, and visceral engorgement. Circumstances, however, may arise, in which it should be prescribed medicinally.

49. *d. Small doses of ipecacuanha* have been advised by HUVELAND, but they are most serviceable in conjunction with *purgatives*, in order to increase their action, or with *diaphoretics*, when the skin is dry and harsh, and then they should be aided by the warm-bath. The production of *artificial eruptions*, as advised by RITTEN, JENNEN, and the author; or the insertion of *setons*, or *issues*, as directed by DE MEZA and others, is often of service, particularly when there is evidence of irritation, or of congestion or obstruction of some internal organ. In these cases, the application of *moxas* or of *blisters*, or of stimulating and *rubeefacient liniments*, may likewise be tried.

50. *e. Dr. GULLY* justly remarks respecting the *Hygeiæ treatment* of hypochondriasis, that the mental distractions accompanying the participation in exciting social scenes, the vigorous exertion of the voluntary power implied in strong muscular exercise, and the shocks given to the entire nervous system, are always beneficial in this complaint. The hypochondriac should be persuaded to the exertion of his volition in active muscular exercises. He does not lack muscular power, but he wants the mental energy necessary to its exertion. He should always walk or ride before his meals, rise early, and take half an hour's exercise in the open air before breakfast. His mental faculties also should be actively engaged, as this writer very judiciously advises, on matters alien to his personal health. His imagination should be roused and directed towards other subjects. Although perturbed only with reference to his health, his fears should be met by the reasoning and feeling of his physician, who should endeavour to gain his confidence by evincing a due interest in his case, and combat his morbid feelings

in a manner which an educated tact will readily suggest.

51. Upon the whole, although the treatment of hypochondriasis requires to be modified in a thousand ways to meet the innumerable phases of the complaint, and fancies of the patient, the means advised by STOLL (*Rat. Med.* p. i. p. 245.), will be found the most generally appropriate, and the most beneficial, if persevered in: these are, abstemious diet, early rising with friction of the abdomen in the morning, cold bathing and warm clothing, and exercise in the open air.

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HYSTERIC AFFECTIONS.—*SYN. Hysteria; παθος ιστηρικον* (from *ιστερα*, the womb), *ιστηρικον αυξ*, *Suffocatio Uterina*, *Suffocatio*, *Suffocatio Mulierum*, Pliny. *Affectio Hysterica*, Willis, Sydenham. *Malum Hysterico-hypochondriacum*, Stahl, *Asthma Uteri*, Van Helmont. *Ascensus Uteri*, *Strangulatio Vulvæ*, *Passio Hysterica*, Auct. var. *Hysteria*, Sauvages, Linnæus, Vogel, Cullen. *Hyperkinesia Hysterica*, Swediaur. *Clonus Hysteria*, Young. *Suspasia Hysteria*, Good. *Vapeurs*, Mal de la Mère, *Affection Hystérique*, Fr. *Mütterkrankheit*, *Mütterbeschwerden*, *Aufsteigen der Mütter*, Germ. *Isterismo*, Mal di Matrice, Ital. *Fits of the Mother*, *Rising of the Mother*, *Vapours*, *Hysterics*, &c.

CLASSIS.—2. Class, Nervous Diseases; 3. Order, Spasmodic Affections (Cullen). 4. Class, Diseases of the Nervous Function; 4. Order, Affecting the Sensorial Powers (Good). II. CLASS, III. ORDER (Author, in Preface).

I. DEFIN.—Nervous disorder, often assuming the most varied forms, but commonly presenting a paroxysmal character; the attacks usually commencing with a flow of limpid urine, with uneasiness or irregular motions, and rumbling noises in the left iliac region, or the sensation of a ball rising upwards to the throat, frequently attended by a feeling of suffocation, and sometimes with convulsions; chiefly affecting females from the period of puberty to the decline of life, and principally those possessing great susceptibility of the nervous system, and of mental emotion.

2. Under this definition may be arranged all those disorders which, from their varied and changing forms, and their resemblance to many serious, and even to several dangerous or structural diseases, have puzzled and misled the inexperienced. SYDENHAM first gave a fall, and, upon the whole, a satisfactory account of hysterical affections; and WHYTT more recently threw additional light on several of their forms and relations. CULLEN accurately described their more convulsive states, but neglected those anomalous or irregular forms of complaint, which are equally frequent and important with these. From the descriptions of GOOD, MACINTOSH, and some other recent writers, it might at once be inferred that their experience as to this disorder was very imperfect; that they were entirely ignorant of the writings of SYDENHAM and WHYTT; and that the state of our knowledge in respect of it had retroceded, instead of having advanced, with the general progress of science. Very recently, however, the able and elegant treatise of Dr. CONOLLY has retrieved the character of our literature as to hysteria, and furnished us with a more comprehensive view of its nature and treatment.

3. The varieties, forms, and states of hysterical affection are so numerous, that the difficulty of describing and arranging them is very great. The modifications consequent upon age, temperament, diathesis, habit of body, states of nervous susceptibility, physical and moral education, and on the states and grades of society, are so various, that they cannot all be comprised within the limits to which I am necessarily confined. Enough, however, will be advanced to guide the practitioner to the recognition of the nature of such affections as may not fall exactly under any of the varieties

into which I shall divide this complaint. The difficulty of accurately describing disease is great, inasmuch as the phenomena constituting it vary in every case with the circumstances just enumerated, with the causes producing them, and with numerous accidents and occurrences, independently, even, of their duration and intensity; but it is especially great in respect of hysteria. In the history about to be given of it, I shall notice — 1. Its more mild and regular forms; — 2. Its more severe states; — and, 3. The more irregular and anomalous conditions or modes in which it sometimes manifests itself.

4. I. THE MILD AND MORE REGULAR FORMS OF HYSTERIA present various modifications, depending chiefly upon the number of the circumstances or symptoms characterising them. — *a.* They appear generally in paroxysms or fits, and commonly begin by painfulness or uneasiness in the left iliac region, or hypogastrium, or in the left side; and are often preceded by a large flow of limpid urine, or by palpitations, or difficulty of breathing, flatulency, and rarely by nausea, or vomiting. From either of these situations in the abdomen, a ball, the *globus hystericus*, seems to move, with a rumbling noise, and with various convolutions, to the stomach, and thence to the throat or pharynx, where it remains for some time, and gives rise to a feeling of impending suffocation. The attack in its slighter forms may not proceed further, or it may be attended by several other phenomena of a slight or severe kind. In some cases, headach, stiffness about the larynx, dyspnoea, general uneasiness, cramps, &c., precede or accompany the attack; in others, a vermicular or undulating motion of the abdominal muscles attends the rising of the ball, or *globus*.

5. *b.* The seizure, however, may not end with a sense of strangulation, attending the ascent of the ball to the throat. Other phenomena either attend this, or rapidly follow it, particularly lassitude, sadness, despondency; a sense of coldness, stiffness, or weight in the limbs, with sudden and momentary spasmodic contractions, or general shudderings; headach, noises in the ears, or vertigo; pain and flatulence of the stomach; irregular distension of the abdomen, with borborygmi; a sense of constriction in the throat and pharynx, sometimes with swelling; oppression at the chest, dyspnoea, and irregular breathing; and palpitation, or irregular action, of the heart. These fits may occur at any time through the day, but usually two or three hours after a meal. After a time, either copious eructations of air take place, or anguishing pain at the epigastrium, or in the left side, supervenes, which the patient endeavours to relieve by rubbing violently with the hand. She is frequently incapable of utterance, although evincing much bodily and mental agitation, which generally terminates with immoderate or continued fits of laughter, sometimes causing temporary or alarming suspension of respiration, or with fits of weeping, without any assignable cause, or with an alternation of both. With these latter symptoms, the attack may cease. It may recur in a short time, or not for a considerable period.

6. *c.* When hysteria assumes a truly convulsive form, spasmodic actions follow upon the feeling of suffocation, occasioned by the *globus hystericus*, as it reaches the throat. In delicate women, with great mobility of the muscular system, the con-

vulsions are feeble, and present chiefly a clonic or asthenic character; but in the strong and plethoric, they are more sthenic or tetanic. The trunk of the body is writhed to and fro, and the limbs are variously agitated, one arm and hand (most frequently the right) commonly beating the breast repeatedly. The patient often beats her head against the bed or couch, tears her hair, screams, shrieks, laughs, or sobs and cries immoderately. Sometimes the trunk remains stiff, whilst the arms and limbs are tossed in every direction. The muscles of respiration participate in the struggle, and breathing is effected slowly, laboriously or deeply, and spasmodically, often with deep sobs and constriction in the situation of the diaphragm, and occasionally with hiccup. The respiratory efforts are rendered still more laborious by spasm about the throat, pharynx, and glottis, and the patient often applies her hands to her neck and throat, and rubs or strikes the epigastrium, or left side, with the hand: during the struggle, she sometimes bites her arms or hands, or even the bystanders. The abdominal muscles are tense, or irregularly constricted; the belly, especially about the navel, is often drawn inwards, and the sphincters are firmly constricted. The action of the heart is increased with the severity of the convulsions. In some cases, however, it is not much, if at all, accelerated; in others, it is very irregular and unequal; and in all, the veins of the neck are remarkably distended, the carotids beating with more than usual strength. The face is flushed and tumid, or full, particularly in the plethoric; but in delicate females, it is occasionally pale. The temperature is usually reduced, especially in the extremities, at the commencement of the attack; but it is increased as the convulsions proceed, although in the non-plethoric, it sometimes either continues below, or does not rise above, the natural standard.

7. The duration of the fit varies from a few minutes to two or three hours. The recovery from it is attended by a flow of tears, or by a fit of laughter, or by an exclamation, and is generally rapid and complete. Sometimes the patient complains of numbness, or partial palsy of a limb, or of headach, or of loss of voice, after a seizure. And when a copious discharge of limpid urine has not ushered in, it often follows, or both precedes and follows, the attack. Exhaustion, with a desire of remaining perfectly quiet, attends the cessation of the convulsions, but the patient is soon restored to her usual state. She usually retains more or less consciousness of what has occurred in the fit, although she wishes to be thought unconscious of all that has taken place. Loss of consciousness may, however, exist when the fit assumes a very severe or an epileptic form, which it sometimes does in plethoric females; but it is not a general symptom of the purely hysterical convulsion, though ascribed to it by Cullen and many others. Such fits are ready to recur from time to time; and in the intervals, the patient displays much fickleness, or irritability of temper, is capricious, or even experiences fits of laughing or crying, or of both.

8. II. THE MORE SEVERE FORMS OF HYSTERIA vary more in their characters than in their intensity. — In some cases, particularly in the plethoric, and when the attack is consequent upon obstruction or suppression of the catamenia, the fit presents

most of the symptoms of an epileptic seizure. But the accession is not so sudden as in it, and many of the premonitory symptoms of Hysteria are present. The subsequent exhaustion, stupor, or sleep, is also not so great as after a fit of epilepsy, and the patient rarely injures the tongue or foams at the mouth. She is, however, generally deprived of consciousness. The face is tumid and flushed; the trunk presents a tetanic stiffness, whilst the limbs are tossed in every direction; and respiration is so laborious and so obstructed as apparently to threaten dissolution. In some cases, the patient remains for a time seemingly without breathing, the throat and the veins of the neck being remarkably swollen and distended; and the action of the heart, irregular, hurried, or slow, or entirely interrupted for two or three beats. In other instances, she screams, or utters the most disagreeable and unnatural noises, and grinds the teeth. At last the convulsions cease, and after a period of more or less exhaustion, she recovers, often complaining of headach or slight fatigue.

9. In some instances, after a severe fit, or after violent nervous agitation, and great disorder of the circulating and respiratory functions, the patient sinks into a state of coma, or of hysterical apoplexy, depending upon cerebral congestion. In other cases, a complete state of collapse takes place, respiration being hardly observable, and the pulse so weak, slow, and small, as not to be felt at the wrist. The surface and extremities become pale, cold, and inanimate; and the patient continues in this almost lifeless state for a considerable time. Some of the instances of supposed death, in which persons have been said to have nearly escaped being buried alive, have been of this kind. I have seen some instances of this form of hysteria — *hysterical syncope* — so severe as to occasion some alarm, and M. VILLERMEY considers that death may supervene upon it. Extreme cases of this description have been noticed by PLINY, LANCISI, and others; the instance in which VESALIUS began to dissect a body to which life returned on the application of the scalpel, was probably of the same nature. But cases of hysterical coma, or of apoplectic congestion consequent upon the hysterical paroxysm, should not be confounded with these. In hysterical coma, the pulse is but little affected; but in hysterical syncope, it can hardly be felt at the wrist. Upon recovery from these states, especially from the latter, the patient often experiences catchings, spasmodic contractions of the extremities, shudderings, or convulsions of short duration, accompanied by forced or irregular respiration. Sometimes the paroxysm is not only severe, but is attended or followed by a kind of delirium, or by nymphomania of short continuance.

10. In a few instances, especially where hysteria is obviously dependent upon irritation or congestion of the uterus or ovaria, the paroxysms change their character and assume the form of *cataplexy*, *extasy*, or of *somnambulism*, or either of these nervous affections takes the place of the hysterical seizure. I have seen several instances, illustrating the connection of these with the severer forms of hysteria; and in some, the tenderness in a portion of the spinal column, so much insisted on by some recent writers, was detected. When these nervous affections are thus associated, the attack may

commence, either as a slight, or as a severe hysterical fit, and pass in a short time into the cataplectic or extatic state, or it may begin in the form of extasy, cataplexy, or somnambulism, and pass into the hysterical convulsion; but I have likewise seen the paroxysm consist of one of these in its pure or unassociated state. Besides these more severe states of the complaint, various symptoms may assume an unusual and distressing prominence; the sense of strangulation in the throat may be so great as to occasion the utmost distress and alarm, and it may be accompanied by inability of utterance, by flatulent distension of the belly, hiccough, or borborygmi, and remarkable undulation throughout the abdomen. Occasionally the lighter and severer forms of the complaint will alternate with each other; and the latter is frequently induced when the former has existed, by powerful mental emotions or sudden impressions. Sometimes the severer fits alternate with loss of voice, — *Aphonia hysterica*; — or with temporary paralysis of certain parts, giving rise to *dysphagia*, or to *ischuria* in some instances; and they may even terminate in *epilepsy*, *mental derangement*; or *fatuity*. In some instances of severe hysteria in the unmarried state, I have observed puerperal mania supervene after marriage, and follow almost each confinement. These states of hysteria occur not merely in different persons, but sometimes in the same person at different times. Females who are liable to, or who have suffered from, the disease, often acquire so much sensibility, or become so susceptible, as to be strongly affected by every impression that occurs suddenly or by surprise.

11. In the intervals between the paroxysm, the general health is more or less deranged; but some functions betray more disorder than others. Digestion is impaired, and there is often a craving after indigestible or hurtful articles, as cheese, cucumber, acid fruit, acids, pickles, &c.; or after food at improper hours. Digestion is usually attended by flatulence, borborygmi, lowness of spirits, and proneness to tears. The bowels are commonly coative; but they are sometimes lax or irregular. The tongue is red at the point and edges, and slightly furred or loaded, or somewhat white in the middle and base. The pulse varies, the least emotion or surprise causing great acceleration of it, or palpitations of the heart. The catamenia are seldom regular as to quantity, or the period of appearance. They also often depart from the healthy character, in the various ways described in the article *Menstruation*. They may moreover be delayed, retained, suppressed, too frequent, excessive; or they may be painful, difficult, and attended by various phenomena, referrible to morbid conditions of the uterus or of the ovaria. They may also be preceded or followed by leucorrhœa. So much is the health of hysterical females disordered, and so intimate a connection often exists between such disorder and the hysterical paroxysm, that the latter, especially in its slighter forms, seems merely an aggravation, or an exacerbation, of the more or less continued complaint, or as an increased state of the nervous symptoms.

12. In those cases, which are more obviously dependent upon uterine irritation or vascular determination to the sexual organs, irregular or painful menstruation is generally observed, and the discharge is preceded or attended by pain in

the back, loins, or thighs, or in the sacrum and hypogastrium, with forcing or bearing down, and sometimes by tenderness upon pressure above the pubis. Leucorrhœa is usually present, and sometimes also dysuria, or even *stranguria*, although not always mentioned or admitted by the patient. The menses may be very irregular, — at one time excessive, and at another, scanty; — now too frequent, and afterwards disappearing for months. The hysterical paroxysm is often connected with the approach or presence of the catamenia; but it is also often brought on at other times by mental emotions or surprise, and by fatigue, and in some instances it is characterised by signs of an unusual increase of the sexual appetite, amounting in some cases to temporary nymphomania, and constituting the *Hysteria libidinosa* of nosologists.

13. III. THE IRREGULAR AND ANOMALOUS STATES OF HYSTERIA are so diversified that a full account of them can hardly be comprised in the limits of this article. As well as the more fully developed affection they frequently depend upon excitement of the sexual nerves by feelings connected with the instinctive affections and appetites, or upon local irritation of the uterine system. In either case, the one acts upon the other — the mental excitement upon the organic functions, and the local irritation upon the mind; and brings within the range of its morbid influence various parts of the nervous circle; the altered sensibility attendant upon the local affection being manifested, not only in the primary seat of disturbance, but also in other parts, with which there is the most intimate sympathy in particular cases, or which, owing to their naturally exalted state of sensibility, most readily participate in the original affection. Granting that the nerves supplying the uterus, the ovaria, and the more external parts of generation, are in a state of morbid irritation — a state which the conditions and functions of those parts, as well as the symptoms, render extremely probable, — the influence extended to other parts of the economy, particularly in susceptible or delicate persons, may be readily inferred. The relations of these nerves to those supplying the respiratory, circulating, and digestive organs; the circumstance of their being a part of the same system; the effects which they produce, both directly and indirectly, upon the circulation in the brain; and their intimate connection with the nerves of sense and of the spinal axis, will serve to explain many of the phenomena, and to account for the multiplied mutations, observed in hysterical affections. When a disposition to irritation or morbid excitement exists in the uterine nerves, those emotions or feelings which have an intimate relation to sexual function, will often be sufficient to rouse this irritation, and to bring in its train certain of the various morbid manifestations generally associated with it, and constituting its more outward and evident phenomena. The intimate connection existing mutually between certain mental emotions and uterine disturbance, whether the mental or the organic sensibility be first excited, and the close association of both with the more prominent symptoms of hysteria, are so fully established, and are so important in a practical point of view, that they should never be overlooked when affections of an anomalous, an irregular, or Protean form, occur in females from the period of puberty to the decline of life. Many of the affections during this

period of female existence not only proceed from the source here stated, and are truly hysterical in their pathological relations, but also simulate other maladies of a more serious nature, and therefore require to be accurately recognised in practice. They, moreover, do not only occur in different cases, but sometimes also several of them may appear in succession in the same person, or two or more of them may exist at the same time, thereby increasing the difficulty of diagnosis.

14. A. — *Altered sensibility, or pain of a truly hysterical nature*, is a frequent occurrence, and in some cases may be mistaken for inflammation of a subjacent or adjoining viscus. The situations in which hysterical pains are most frequently felt, are — a. The head, often attended with the *clavus hystericus*; — b. Below the left mamma, or at the margins of the ribs; — c. In the region of the stomach and spleen; — d. In the course of the descending colon, and in the left iliac region; — e. Above the pubis; — f. In various other parts of the abdomen, or in the abdomen generally; — g. In the region of the kidneys, sometimes extending in the course of the ureters; — h. In one or more of the lower dorsal or lumbar vertebræ; — i. In the sacrum; — k. In the hip, or knee joint. Although these are the more frequent situations, pain may be felt so seriously in others, as to alarm the patient, as in the pharynx and larynx, in one or both mammae, or in the region of the liver. —

15. a. Headach, with or without the *clavus hystericus*, generally limited in extent, especially to the forehead, is a frequent circumstance in both the regular and anomalous forms of hysteria; but I must refer the reader to what I have stated respecting it in the article HEADACH (§ 10.).

16. b. Pain below the left mamma, and above the margin of the left ribs, is a very frequent occurrence. It may continue for weeks, or even for months with little intermission. It is very circumscribed, is seldom attended with cough, but frequently with palpitation of the heart, and with increased sensitiveness to the impulse of this organ. It is sometimes, although not necessarily, increased by a forced inspiration, and by external pressure. The precise source of this pain cannot be stated with certainty. Dr. Addison examined the body of a young woman who had this pain for a considerable time in an aggravated degree, and who died suddenly in a fit. The colon, spleen, heart, and stomach were unaltered, but the cardiac orifice of the stomach was surrounded by a ring of red injected vessels. — Pain in these situations depending upon imperfectly developed hysteria is frequently mistaken for pleuritis. The absence, however, of cough, the quiet state of the pulse, particularly when the patient is in the recumbent posture, the versatility and mutability of many of the symptoms, the variability of the patient's mental motions, the existence of disordered catamenia, and especially the absence of the stethoscopic signs of the inflammatory disease, will be sufficient to indicate the nature of the affection. When this pain is attended with palpitations or with morbid sensitiveness of the heart's impulse, and especially if these alternate, or are connected with leipothymia or syncope, pericarditis or organic disease of the heart may be erroneously suspected by both the patient and the practitioner. But a careful examination into the rational symptoms, comparing

them with the signs evinced by percussion and auscultation, the occasional appearance of decidedly hysterical symptoms, as borborygmi, clangor intestinalis, the globus hystericus, uterine disturbance, and the state of the mind, will here disclose the nature of the disease. In this class of cases, there is also more or less disorder of the digestive organs, and in some, tenderness upon pressure of some of the dorsal vertebrae (§ 23.).

17. *c. Pain in the regions of the stomach and spleen* is another frequent manifestation of hysterical disorder, and is often so intense in the former that the patient screams, leans forward, and expresses the utmost agony. It generally comes on suddenly, and lasts from a few minutes to an hour or more. It is increased by pressure, although not very materially, and the pulse is not much affected. This pain may exist without any nausea or retching; but the bowels are usually costive or irregular. It is sometimes accompanied with a sense of heat or irritation in the pharynx, or is followed by a burning sensation at the epigastrium. There seems to be a very intimate sympathy between the spleen and the uterus; irritation of the latter exciting the sensibility and organic contractility of the former in such a manner, as to occasion a belief that it is actually the seat of inflammatory action. The pain felt in the region of the spleen in hysterical cases is never so severe as that which is strictly referrible to the stomach, and pressure is endured much better in the former than in the latter, and often even gives relief. In all such cases, there is no swelling present as in *splenitis*, for which they may be mistaken; but attention to the history of the case, and the good effects of tonic and antispasmodic treatment, will remove any difficulty as to diagnosis, particularly if the functions of the uterus receive due attention.

18. *d. Pain in the course of the descending colon, and in the left iliac region*, may be the only or principal complaint in irregular hysteria. It generally also attends other forms of the disease, and is most frequently seated in the region of the sigmoid flexure, and is attended and aggravated by flatus, which causes a rumbling noise, followed by the globus hystericus, and occasionally by other nervous symptoms. In some instances, the connection of this pain with uterine disorder is very obvious; in others, it is much less so. It is generally independent of disorder of the bowels, although irregularity of them is very frequently observed. That it is purely nervous, is proved by the symptoms, and by the effects of remedies.

19. *e. Tympanitic distention of the intestines* is not an uncommon symptom in hysterical females. Sir R. BRODIE states that it has been mistaken for ovarian dropsy, and that the majority of cases of this disease supposed to be cured by iodine and other remedies have been of this nature. I was the first to employ, and to recommend the use of iodine in ovarian dropsy, and I have derived great benefit from it in several cases; but I cannot see how these affections can be confounded with each other, as the diagnosis is remarkably easy. The absence of fluctuation, and the tympanitic sound produced by percussion, sufficiently indicate the cause of distention. It is only when flatus accumulates about the sigmoid flexure of the colon or in the caecum that there is any resemblance to ovarian dropsy; but other regions, or the abdomen

generally, may be distended by flatus, so as to occasion much pain, to impede respiration, and even to disorder the heart's action.

20. *f. Pain above the pubis* is sometimes complained of, but is rarely the only, or even the principal complaint. It is usually attended by more or less tenderness on pressure, and fulness in this situation, with disorder of the excretion of urine. It is generally associated with colicky pains in the abdomen, or in the loins, sacrum, or adjoining parts. It seems to depend upon congestion of the uterus, as it is frequently relieved by local depletion, and by the increase and regular return of the catamenia, which are commonly irregular or scanty. Pain, however, in this situation may attend an excessive discharge, as well as certain forms of leucorrhoea. When it accompanies the former, it depends upon irritation, and is more decidedly nervous, unless in very plethoric females, in whom an excessive discharge proceeds from active determination of blood to the uterine system. In some cases of this kind, also, the digestive organs and the functions of the kidneys are much disordered.

21. *g. Irregular hysteria may be manifested by pain in various parts of the abdomen, or in the abdomen generally*, especially about the period of the catamenia, and when they are difficult or scanty. The pain often assumes a colicky character—the *Colica hysterica* of various authors,—and shifts its situation. When it extends over the abdomen, it is sometimes accompanied with excessive tenderness, and great inflation of the bowels. It may then be mistaken for *peritonitis*. Attention, however, to the pulse, the uterine discharges, to the fecal and urinary excretions, and to the manner and state of the patient's feelings, will assist the diagnosis. In this form of hysterical affection, a marked incongruity will be observed between certain symptoms: greater pain and tenderness will be felt than the pulse, the tongue, and the evacuations should indicate; the most urgent symptoms will suddenly disappear, and as suddenly return; the mind will be variable and susceptible, and some unequivocal hysterical symptom will often arise. The pain and tenderness will frequently shift their situation, the urine will be natural, or pale and copious, instead of being scanty and high-coloured as in *peritonitis*; and the appearance of the countenance and the postures of the patient will be very different from those observed in inflammations seated in the abdominal cavity. The existence of some derangement in the periods, continuance, quantity, and quality of the uterine discharge, or of pain and difficulty of its accession, or of leucorrhoea, will also tend to confirm the diagnosis.

22. *h. Pain in the region of the kidneys* sometimes extending in the course of the ureters, and even to the urinary bladder, is occasionally the principal affection in hysterical patients. This pain is generally severe and sudden in its attack. When it extends to the bladder, dysuria is often present. This symptom is liable to be referred to inflammation of the kidneys; but here also attention to the existence of uterine disturbance; the marked incongruity of symptoms, particularly between the state of the pulse, the secretions, and evacuations on the one hand, and the pain on the other; the frequent shiftings, the sudden accession, and the sudden cessation of the pain; and the absence of numb-

ness in the thighs, of vomiting, and of symptomatic fever, will point out the nature of the affection.

23. *i. Pain in the dorsal or lumbar vertebrae*, with tenderness upon pressure of the spinous processes, is often complained of by females of a delicate constitution; and, although it may exist independently of hysteria, yet it is frequently associated either with it, or with uterine irritation. Pain in any of these situations is often also connected with neuralgic affections in various parts of the body, especially in the mammary and intercostal nerves, and in the nerves of the lower extremities, as well as with certain affections of the joints, about to be mentioned. Much diversity of opinion exists as to the nature of the pain and tenderness complained of in the spine, and as to its relation to hysteria and to uterine disorder. It cannot be doubted, that it is frequently connected with one or the other, or with both, and that it may exist independently of either. It is also obvious that, although uterine irritation is often accompanied with hysteria, or with pain and tenderness in the spine, or with both, yet it may be present without either. This affection of the spine has been imputed to inflammatory action in the spinal cord or its membranes, or in some of the adjoining structures; but the accompanying symptoms, the duration of the affection, and the effects of treatment do not warrant this inference as respects at least the majority of cases. It has therefore been attributed to congestion, or to that very indefinite state, to which the term irritation has been applied; but the evidence as to the existence of either of these is entirely of a negative kind. It is probable, however, that the uterine disorder, or the morbid state of the uterine nerves, is propagated by the sympathetic system to the roots of the spinal nerves, and that the sensibility of these last is thereby modified, either in this situation or in one or more of their ramifications. Here, as in many other cases, the primary affection of the ganglionic nerves may not be attended by any painful feeling, although it may induce pain in the voluntary nerves, which it consecutively implicates. From this it will appear, that I ascribe the tenderness and pain in the dorsal or lumbar spine, sometimes associated with hysteria, as well as the painful or neuralgic affections, the tetanic and convulsive actions of the voluntary muscles, &c., to irritation or excitement propagated from the uterine nerves by means of the sympathetic to the roots of the spinal nerves, and to the spinal cord itself. But I at the same time admit that more or less of congestion, or of otherwise disordered circulation in the cord and its membranes may sometimes be also thus produced, giving rise to various paralytic or anomalous symptoms sometimes associated with those already mentioned.

24. Hysterical affections, in which the symptoms are referred to the spine, are sometimes mistaken for ulceration of the intervertebral cartilages and bodies of the vertebrae. Sir B. BRODIE has numerous instances of young ladies being condemned to the horizontal posture, and to the torture of caustic issues and setons for successive years, whom air, exercise, and cheerful occupations, would probably have cured in a few months. (*On Local Nervous Affections*, &c. p. 46.) Similar instances have occurred to myself, and are familiar to most physicians. When the pain is

first complained of in the spine, an attentive examination is often necessary to a positive diagnosis. When it is truly hysterical, it is seldom confined to a single spot, and it often shifts its place. The tenderness of the part is peculiar, and the patient often flinches more when the skin is slightly pinched, than when pressure is made on the vertebrae. The pain is even severer than in real vertebral disease, and when spasms are present they often resemble the muscular contractions in chorea. Sir B. BRODIE observes, that surgeons sometimes apply a hot sponge to the spine, believing that, if the patient complains of pain on its application, this is a proof of the existence of caries. I perfectly agree with him in considering that a patient labouring under a nervous pain in the back, will complain of the hot sponge even more than one in whom real disease exists. The history of the case, the appearance of other hysterical symptoms, the state of the catamenia, the aspect of the patient, her age, and other circumstances already noticed (§ 21, 22.) will assist the diagnosis.

Pain in the sacrum and os coccygis depends upon irritation or disorder of the uterus, although the uterine discharge may not be manifestly deranged. It is sometimes associated with pain and tenderness above the pubis (§ 20.). I have met with several cases, in which pain in this situation, has been referred to inflammatory action, or to organic lesion, and been greatly aggravated by depletions and a lowering regimen.

26. *1. Painful affections of the joints* are not infrequent in hysterical females. The joints most commonly attacked are the knee joints, but I have also met with it in the hip joint, the ankle, and in the wrist. Sir B. BRODIE, whose experience of these complaints has been very extensive, states that "at least four fifths of the females among the higher classes of society, who are supposed to labour under diseases of the joints, labour under hysteria, and nothing else." In such cases, the pain is not generally fixed in any one part, but belongs to the whole limb; and when the symptoms are referred to the hip joint, the patient winces and sometimes screams, when either the hip, or the ilium, or the side even as high as the false ribs, or the thigh or leg, as low as the ankle, is pressed upon. The morbid sensibility is chiefly in the integuments; and if they are slightly pinched or drawn from the subjacent parts, the patient complains more than when the head of the femur is pressed into the acetabulum. The more the patient's attention is directed to the part, the more is the pain increased; but if her attention be directed otherwise, she will hardly complain. There is no wasting of the glutei muscles, nor flattening of the nates, nor painful startings of the limb at night, nor frightful dreams, as in true hip joint disease. Sometimes this hysterical affection is attended by much swelling of the nates, or of the thigh, without leading to abscess, owing to turpidity of the small vessels, and to effusion of the more deep-seated cellular tissue. In a case which I am now attending, there is a defined and circumscribed swelling; but there is not the least fluctuation, redness, nor throbbing. Instead of the wasting of the glutei muscles attending hip-joint disease, there is a bulging of the pelvis posteriorly, at the same time that it is elevated on the affected side. Hence the limb is apparently

shortened, and when the patient stands erect, the heel does not come in contact with the ground. This is owing to the predominant action of certain muscles, and to a long-continued indulgence in an unnatural position.

27. When the affection is referred to the *knee*, it resembles that just described. There is great tenderness, but it extends some distance up the thigh and down the leg, sometimes to the ankle and foot. The morbid sensibility is chiefly in the integuments, and not in the deep-seated structures. The leg is usually kept extended, and not bent as in disease of the knee joint. There is occasionally swelling, but this is rarely very great. In a case, however, that I attended, the swelling was very great, its accession and disappearance being sudden. Sir B. BRODIE remarks that this affection may continue without material alteration for weeks, months, or even for years. In the case just now referred to, recovery took place in a few days.

28. In hysterical affections of the joints, the catamenia are usually scanty, suppressed, or otherwise irregular. The extremities are frequently cold, and the affected limb is sometimes cold and at other times warm; or there are frequent alternations of heat and cold. Occasionally towards evening, the surface of the affected joint is hot to the touch, and the vessels turgid; but there is no throbbing or other indications of the formation of an abscess. As in many other forms of local hysteria, these affections generally appear during bodily exhaustion, or mental depression: they are often excited by the depressing emotions of mind, and are as often benefited by whatever rouses the mental influence, or leads to bodily exertion.

29. *m. Painful affection of the breast* is sometimes met with in females subject to hysterical disorder, and is always connected with derangement of the uterine system. In some instances, especially in the more prolonged, the pain is attended with hardness and swelling of the gland. This affection is liable to be mistaken for a much more permanent and severe disease of the organ. It has been described by Sir A. COOPER and Sir B. BRODIE; but it has been noticed by numerous other writers, in connection with hysteria and uterine disorder, and in rarer cases, with pain in the course of the lactation. The patient shrinks from pressure, and cannot bear even the skin to be slightly pinched. The examination of the part often produces twitches, or motions resembling those of *chorea*; yet, if her attention can be engaged otherwise, neither much pain, nor these motions, will be occasioned. The morbid sensibility frequently extends to the axilla, and down the arm. This affection usually disappears after a treatment judiciously directed to the removal of congestion or irritation of the uterine organs, and to the regulation of their functions.

30. *n. Pain is sometimes complained of in the region of the liver, and at the margin of the right ribs.*—It may be mistaken for chronic hepatitis, and there may be some difficulty in forming the diagnosis. I was lately consulted in a case of hysteria, where pain in this situation was a prominent circumstance, and was associated moreover with jaundice. A free use of mercurials had increased the hysterical affection, without benefiting the jaundice. This latter, however, disappeared during the use of the alkaline subcarbonates and taraxacum, with gentle bitters and tonics, and an-

tispasmodics. The history of the case, the state of the uterine functions, the appearances of the tongue and of the alvine evacuations, and the absence of pain at the top of the right shoulder, will readily distinguish this affection from chronic hepatitis. The other circumstances alluded to above (§ 21, 22.) will also assist the diagnosis.

31. *B. Irregular hysteria giving rise to, and simulating various spasmodic affections.*—*a.* Sometimes the respiratory organs are the seat of the spasmodic disorder. Occasionally the attack resembles that of *asthma*, the paroxysm of dyspnoea being preceded or attended with many of the symptoms of the hysterical fit. In other cases the patient is liable to paroxysms of a dry convulsive cough—the *Tussis hysterica* of authors. Not unfrequently the hysterical tendency manifests itself by severe or repeated attacks of *hicough*, or of *sneezing*, sometimes accompanied by loud exclamations. Occasionally, the spasmodic disorder affects some portion of the digestive tube, or shifts along it, giving rise to *dysphagia*, or to porraceous vomiting, or spasmodic gastrodynia, or to colic—the *colica hysterica* of authors. *Hysterical dysphagia* is sometimes attended by the globus hystericus, borborygmi, and even by a dread of swallowing fluids, or *hysterical hydrophobia*. *Hysterical gastrodynia* and hysterical colic are frequent attendants upon difficult, scanty, or otherwise disordered menstruation.

32. *b. Hysteria may manifest itself chiefly by spasm of the voluntary muscles, giving rise to affections resembling trismus, opisthotonos, or pleurosthotonos.* It may also occasion certain anomalous convulsions, and a form of *chorea*, which may be termed hysterical, as partaking of many of the characters of both diseases, and occurring about the period of puberty, generally in consequence of disordered menstruation. In all these affections the pulse is soft, and generally quick, particularly when the patient is erect or sitting up; but it becomes much slower, or natural, as to frequency, when she is recumbent. Irregularity of the menstrual discharge, or leucorrhœa, and pain in the left side, or in the region of the spleen, and sometimes tenderness or pain in some part of the spine, attend these affections. The same symptoms, circumstances, and peculiarities, already alluded to with reference to painful hysterical affections, (§ 21.), will also serve to point out the nature of those just mentioned.

33. *C. Hysteria sometimes gives rise to various comatose, cataleptic, or soporific states.*—These states may supervene on imperfectly developed hysteria, or be preceded by hysterical symptoms, particularly borborygmi, the globus hystericus, a variable and excited state of mind, by uterine disturbance, or sudden arrest of the catamenia, &c.; and they may be directly occasioned by fright, sudden surprise, by various mental emotions, sexual excitement, or whatever startles or unexpectedly affects the patient. In these cases the irritation, whether mental, cerebral, or uterine, seems to induce congestion of the vessels of the head, or impeded circulation through them.—*a.* The relation of *catalepsy* to uterine or sexual excitement, and consequently to hysteria, has been manifested in most instances. Since the article *CATALEPSY* was written, I have seen two cases of this affection, and in both these, as well as in those noticed in that article, this relation was

evinced. In one of these, the attack was observed by Mr. BYAM and myself from its commencement until its termination.

34. *b. Coma* also occurs in rare instances, and even assumes the form of congestive apoplexy: the patient is insensible, the pulse is regular and full, the respiration is calm or profound, and the face is either natural or flushed. The seizure is usually preceded by indications of hysterical disorder, or of uterine affection; its duration varies from a few to many hours; and unless the patient be injudiciously treated, owing to its being mistaken for apoplexy, it terminates in rapid or sudden recovery of consciousness or voluntary motion, without any paralytic affection. This attack is merely a modification of catalepsy, or it nearly approaches the latter in certain of its states. At the time of writing this article, I was requested by Mr. GRANT, of Thayer Street, to see a female, who suddenly became comatose after evincing hysterical symptoms. He judiciously directed cold applications to the head, and a continuance of these for a few hours restored the patient.—The *apoplectic* form of the attack, or that in which the patient lies in a profound sleep, respiration being so low as hardly to be noticed, and the pulse weak and small, is more frequent than the foregoing, and has been noticed by WUHL, VILLERMAY, CONOLLY, and others.

35. *D. Hysteria may simulate paralytic affections.*—In such cases, there is seldom a fully developed state of hysteria, but merely an occasional manifestation of certain of its symptoms, and a concomitance of uterine disturbance in some one of its forms. In most instances of these, as well as of other irregular hysterical affections, the variable character of the temper and mind, and the exalted sensibility and irritability of the body, are evinced.—*a.* The paralytic form of hysteria is sometimes connected with spasm, inability to move being attributable rather to this, than to loss of power. Occasionally, also, it depends upon a deficient exertion of volition, the patient being capable of moving the limb when excited. This affection may occur in a single limb, or in both; it may even closely imitate *paraplegia*. Sir B. BRODIE mentions an instance of hysterical paraplegia, which had been improperly treated, before he saw it, by large depletions, &c., and which consequently terminated in sloughing of the nates and in death; the brain and spinal cord were not altered from the healthy state; the thoracic and abdominal viscera were also sound.

36. *b.* When the paralytic state affects internal parts, particularly the digestive canal, it is limited in extent, and conjoined to spasm in its immediate vicinity. It is doubtful, whether or not, the dyspnœa of hysterical subjects may not also depend upon one or other, or rather upon both, of these conditions.—A seemingly paralytic state of the bladder is also met with in young women, especially those who are subject to pains in the loins, pelvis, or hypogastrium; and, like other paralytic affections, is sometimes attended by pain or tenderness in a portion of the spine. *Hysterical retention of urine* arises either from temporary paralysis of the muscular coat of the bladder, or from spasm of the neck of this viscus, caused by irritation of adjoining parts. Hysterical females are liable to an excessive

secretion of urine from mental emotion; and if imperfectly exerted volition, or other circumstances, allow its accumulation, the bladder soon loses its contractile power, owing to over-distention.—There is every reason to suppose, that many of the most constant and pathognomonic symptoms of hysteria proceed from irregular spasmodic and paralytic states of the muscular coats of the digestive canal, in connection with inflation, propagated from the large bowels to a greater or less extent, and frequently as far as the œsophagus.

37. *c. Aphonia, or loss of voice* is not an uncommon symptom of hysteria. It may occur also to follow a paroxysm. It is doubtful, however, how far it depends upon deficient muscular power, or upon spasm. It is sometimes associated with hysterical dyspnœa, cough, or the globus hystericus. Occasionally it is accompanied by symptoms indicating chronic laryngitis, or œdema glottidis. In a case of this description, lately under my care, the hysterical character of the affection became developed after the application of leeches.

38. *E. Hysteria may manifest itself chiefly by disorder of the mental emotions and faculties.*—The mental affections connected with hysteria may be referred to one or other of the following:—1st. To certain states of monomania, amongst which excited desire, amounting in some cases to nymphomania, may be enumerated;—2d. To ecstasis and mental excitement, in some cases of a religious nature, in others of different descriptions;—3d. To a state of somnambulism;—4th. To a form of delirium, generally of a lively character, with which various hysterical symptoms are often conjoined;—5th. To various delusions, generally of a hypochondriacal kind, to which the patient may become subject, or even the victim, owing to the indulgence it may meet with from imprudently kind relatives; and 6th. To a desire to feign various diseases, sometimes of an anomalous or singular form. In all these, the occasional occurrence of hysterical symptoms; complaints of shifting, transitory, or anomalous pains; disorder of the uterine functions; the nervous temperament, and the hysterical state of constitution, will evince the precise nature of the affect.

39. *F. Irregular or imperfectly developed hysteria* not merely assumes one or other of these states, but sometimes presents two or more of them; or the one complaint may succeed the other. Hysteria may even put on certain anomalous appearances, which cannot well be classed or accurately described, but which will be readily recognised by the physician after a careful examination of the uterine functions and of the temperament, habit of body, constitution, occupations, recreations, and modes of living of the patient. Some of these local and simulating complaints, as coma, palsy, delirium, &c., may follow the regularly developed paroxysm in one of the severer forms above described (§ 8—10.); but they as frequently appear as the prominent ailment, and as here mentioned. They may also gradually pass into, or nearly resemble, other nervous or convulsive affections described under the heads of CHOREA, CATALEPSY, CATALEPTIC ECSTASY, CONVULSIONS, EPILEPSY, HYPOCHONDRIASIS, &c.

40. IV. *HYSTERIA IN MALES?*—Numerous writers of great respectability have believed in the occur-

rence of hysteria in males during states of debility. I have never met with a case, however, in which the complaint was unequivocally developed; but I have seen several nervous affections in males of a susceptible and irritable temperament, weakened by disease, or by over-exertion, that have assumed some of the characters of hysteria, particularly in its irregular or undeveloped state. Cases of hypochondriasis and of melancholy in the male, occasionally present somewhat of an hysterical character; thus I have met with an instance of hypochondriasis in a gentleman aged about forty, who complained of painful attacks of priapism, of a feeling of stricture about the throat, with shedding of tears, miserable depression of spirits, &c.; and yet who could readily join in lively and amusing conversation. Such instances serve to show the relation existing between hysteria and hypochondriasis—a circumstance not less deserving attention, than the distinctions between them. Of the facts adduced and alluded to by SYDENHAM, HOFFMANN, WHITT, FERRIAR, VILLERMAY, GEORGET, and CONOLLY, favouring the opinion as to the occurrence of hysteria in males, the most conclusive is that recorded by Mr. WATSON (*Edinb. Med. and Surg. Journ.* vol. xi. p. 303.). A strong man complained of giddiness and headach, and was seized with epileptic convulsions. After some hours, the symptoms returned with alternate laughing and crying, spasms about the throat, and inability to speak, although he was perfectly sensible. Dr. THOMAS states (*Medicina Nautica*, vol. ii.), that hysterical fits occurred in some cases sent to hospital ships, and that they were attended “by violent convulsions, globus, dysphagia, immoderate risibility, weeping and delirium.” It is very possible, that unaccustomed continence in the male may, in rare cases, and in the nervous temperament, give rise to seizures of an hysterical nature. I was consulted by a young gentleman, who complained of headach and several of the symptoms of hysteria, after prolonged periods of continence. I recommended him to marry: he adopted my advice. I saw him two or three years afterwards, and he told me he had had no return of the complaint. A similar instance to that adduced by Dr. CONOLLY, and which arose from intense study, occurred to me some years since. I was recently consulted in the case of a young man of the nervous temperament, who had become early addicted to drunkenness, and who relinquished the habit under the guidance of his friends. Soon afterwards, upon the occurrence of a domestic calamity, he was attacked by a nervous complaint, in which it was difficult to determine whether the hypochondriacal or hysterical character predominated.

41. V. COMPLICATED HYSTERIA.—Hysteria may appear, in either its developed or irregular forms, in the course of numerous other diseases. It may occur at the crisis of, or during recovery from, fever or inflammatory diseases; during the progress of, or in early convalescence from, inflammations of the respiratory organs; or in the course of pulmonary consumption. It is sometimes complicated with asthma—*Hysterical Asthma*; and is very generally a symptom of, or associated with, inflammations of the uterus or ovaria, particularly when these take place independently of the puerperal states. It frequently also

attends leucorrhœa and structural lesions of these organs. Hysteria may occur during pregnancy; but it is oftener suspended by this state, as well as by lactation, although it sometimes appears a few weeks after delivery. Its frequent connection with irritation of the spinal cord, with functional disorder of the heart, &c., has been already alluded to; and it is often associated with hypochondriasis. It is often also consequent upon derangements of the digestive organs, especially those in which the gastro-intestinal mucus surface is in a state of irritation. It is not infrequently connected with disorder of the urinary organs, the urinary secretion and excretion being affected in various ways, besides that which more usually characterises the hysterical seizure. When hysteria appears in the course of other maladies, it is generally owing to the temperament and constitution of the patient, and to debility or exhaustion of nervous power, from disease or from treatment. Hence its occurrence after excessive or inappropriate depletions, after hæmorrhages, after parturition, and after fevers.

42. When hysteria is complicated with these or other diseases, or when these affect hysterical females, a prolongation of disease, or further complications, and a protraction of convalescence, are frequently produced. Dr. CONOLLY justly remarks, that in the course of a long hysterical disorder, and yet more readily in the course of fever in an hysterical patient, inflammatory action may take place at the origin of previously irritated nerves, or in the brain, or other organs: tenderness of the spine may become excessive; and disordered sensation and impaired power of motion may indicate the existence of something more than mere irritation. These symptoms may disappear as the patient gains strength; but they sometimes become more intense and constant, and assume more serious form than the shifting, evanescent, or local tenderness and pain, affecting various parts as described above (§ 14.).

43. VI. DURATION AND TERMINATIONS.—a. The duration of the paroxysm of hysteria varies from a few minutes to many hours; but the continuance of the complaint is very uncertain. Hysteria may not again recur after a single seizure, especially if it have been induced by the more powerful causes; but this is seldom the case, for when it has once appeared, there is a predisposition to its return in one or other of its various forms, upon the recurrence of any of the predisposing or exciting causes. Much, however, will depend upon the general health and circumstances of the patient. It may thus re-appear after intervals of various duration; or it may hardly ever be completely absent, in some one or other of its numerous modes, during the greater part of the period between puberty, or the age of twenty, and the complete cessation of the catamenia. It seldom occurs even in those subject to it after this latter epoch: yet I have seen instances of it induced by mental emotion, at a much later period of life. A very large proportion of the ailments of females during the period of uterine activity, however diversified their characters may be, are really hysterical. Hence many females enjoy much better health after this change has been quite completed than they did previously; although about the period of change, their complaints are often aggravated.

44. b. The Terminations of hysteria are—1st,

In a more or less complete restoration of health. 2d. In some other complaint, into which it may altogether merge and disappear, or with which it may become associated. It rarely or never terminates in death, unless from neglect or improper treatment. — (a) Restoration of health depends very much upon the attention paid during treatment to the removal of the causes, to the state of the general health, to the uterine functions, and to associated disorder. — (b) Hysteria may pass into epilepsy, or assume various convulsive forms. It may terminate in mania, and more rarely in confirmed insanity, or in mental imbecility. Females who have been subject to hysteria in the unmarried state, especially if it have assumed the fully developed or convulsive form, are more disposed than others to puerperal convulsions and to puerperal mania; although marriage sometimes entirely removes, or ameliorates the complaint. It may also terminate in inflammation of the membranes of the brain, or of the spinal cord; but this does not occur so frequently as some suppose. It occasionally gives rise to inflammation of the uterus, or of the ovaria; but in these cases, the irritation or congestion of these parts, and disorder of the uterine functions, upon which the hysteria depended or was associated, are only more fully developed, or converted into the inflammatory state by it. Although it often deranges the functions of the heart and lungs, it seldom occasions serious diseases of these organs; but it often aggravates pre-existent disorder of them, as well as of the several digestive viscera.

45. VII. DIAGNOSIS. — It is generally easy to distinguish the more fully developed states of hysteria from other affections; yet this is occasionally very difficult; and it is particularly so to distinguish several of the more irregular forms of the complaint from those diseases which they so closely simulate. Of the *diagnosis* of these forms I have made sufficient mention in my descriptions of them. — a. Fully formed hysteria may be mistaken for epilepsy, and the mistake is the more likely to occur, as the former may pass into the latter, particularly when affecting plethoric persons, or when neglected; but it then usually assumes the uterine form of epilepsy. PINEL, VILLERMAZ, and CONOLLY, have properly insisted on the importance of forming a correct diagnosis between these two maladies, and especially of not imputing epilepsy to a female who is merely hysterical. "It is important to humanity, and to the peace and happiness of families," adds M. VILLERMAZ, "that these complaints should be correctly distinguished." Epilepsy is an hereditary disease, is incurable in the majority of instances, and generally weakens the intellects and the understanding — circumstances which cannot be imputed to hysteria. — SYDENHAM, TISSOT, and VILLERMAZ advise that not only should the symptoms and mode of attack in both be inquired into, but also the causes which occasioned the seizure: yet too much reliance should not be placed upon these in the formation of a diagnosis. The most frequent causes of hysteria are, the emotions of love and jealousy, voluntary or compelled continence, longings after ardently desired objects, or unsated desire, disorders of menstruation, &c. (§ 54.); — those of epilepsy, on the other hand, are hereditary predisposition, fright, terror, &c. (See art. EPILEPSY, § 19—24.)

46. In epilepsy, the seizure is sudden or instantaneous; the patient often utters a loud cry, falls violently to the ground, froths at the mouth, protrudes the tongue, which is generally injured by the teeth, and is altogether unconscious. The eyes are distorted, the muscles of the face violently convulsed, and the pupils are insensible to light. There are generally no precursory symptoms, and there is no sensation of globus hystericus. The epileptic attack terminates in sopor, or a heavy sleep, from which the patient awakens exhausted, complaining of headach and depression. In hysteria, on the other hand, the seizure is more gradual; is generally preceded or attended by the globus; neither frothing at the mouth, nor protrusion of the tongue, nor distortions of the face and eyes characterising it. The hysterical patient retains her consciousness, or remembers what has passed during the paroxysm; and although she laughs and weeps alternately, the muscles of the face are not otherwise convulsed. At the termination of the fit, there is often a tendency to sleep, or rather a desire to remain quiet; but there is no sopor or heavy sleep, unless in the comparatively rare form of hysterical coma. There are always borborygmi, pain in the left side, and a copious flow of urine. M. GILBERT attaches most importance to the absence of the precursory symptoms observed in hysteria, the complete loss of consciousness, and the distortion of the mouth, protrusion of the tongue, and state of the eyes, in determining the existence of epilepsy. When hysteria is about to pass into epilepsy, distortion of the eyes and of the muscles of the face is the surest indication of the transition; and when to this, frothing at the mouth, injury of the tongue, and complete loss of consciousness are added, the epileptic character is fully developed. Numerous other circumstances connected with the history of the case, and the occurrence of the attack, already stated in the description of both diseases, will assist the diagnosis. When a convulsive paroxysm occurs in males, there can be rarely any doubt as to its nature; but when it appears in females, an attentive inquiry into its peculiarities, and into the state of the uterine functions, is especially requisite; for, although it may be hysterical, it may pass into the epileptic form, or it may present a mixed character, but attention to the pathognomonic symptoms just stated, will readily determine the nature of the seizure.

47. b. Although *hypocondriasis* and hysteria are distinct diseases, yet they frequently approximate each other, or are even associated in females; indeed, most hysterical females may be said to be hypocondriacal, especially if hysteria has become habitual or confirmed. Dr. CULLEN remarks, that the two diseases have some symptoms in common; but they are for the most part considerably different. Spasmodic disorder is rare in the one, but frequent unto a great degree in the other. Persons liable to hysteria are sometimes affected at the same time with dyspepsia: they are often, however, entirely free from it; but this never happens to those subject to hypocondriasis. These complaints occur mostly in different temperaments, ages, and sexes; a circumstance requiring no illustration. The association of them in the female, and perhaps in rare instances in the male, as in the cases above alluded to (§ 40.), is of too much importance to be overlooked. Considering how

much the several parts of the body are connected, and how much the several functions depend upon each other, we cannot wonder that their morbid affections should often be mixed, or insensibly pass, the one into the other; the effect of this is indeed that there are no universal distinctions, and that in a few cases only are there exact limits between analogous or similar diseases. Accurate observation and precise description do much in extricating us from this confusion; but in some cases still, we must remain in doubt and in difficulty. Yet even in these, it will matter but little as to what name we may use, so long as we recognize and estimate with accuracy the nature, extent, and relations of the morbid condition.*

48. VIII. CAUSES.—i. *Predisposing*.—Hysteria may be said to be almost peculiar to the *female* sex; for the instances of its appearance in the male are so rare, and so problematrical, as respects its fully developed and convulsive states, as hardly to be taken into account. — a. The age at which females are most liable to it is from fifteen to fifty; and especially from twenty to thirty, and again from forty-two to forty-eight. It sometimes does not occur until the latter epoch; but it rarely recurs at a later period of life. Hysteria is very seldom observed before puberty; but considering that menstruation commences in some cases, particularly in young ladies in boarding-schools, as early as the tenth and eleventh years, the appearance of this complaint, in some one or other of its forms equally early, cannot be a matter of surprise. — *Temperament and diathesis* evidently predispose to hysteria;—nervous, sanguineo-nervous, and irritable temperaments, and persons of a lax, weak, or delicate, impressible and soft habit of body are most subject to it. As this state of constitution is derived from the parents, the opinion of HOFFMANN, FRANK, and others, as to its occasional dependence on hereditary predisposition, cannot be disputed. The children of debilitated, exhausted, or aged parents, and those who are of an impaired constitution, either originally or from early management and education, are most likely to be subject to this disorder.—A plethoric habit of body, joined to relaxation or deficient tone, predisposes to the more developed convulsive states; and a thin or spare habit, associated with delicacy of conformation and susceptibility of the nervous system, to the more irregular forms.

49. b. There is perhaps no other malady, which depends so much as this upon the *management* of childhood, and on the moral and physical *education* of early life. A luxurious and delicate mode of living, and of rearing; a neglect of whatever

promotes the powers of the constitution, especially of suitable exercise in the open air, and of early hours as to sleeping and rising; an over-refined mode of education, and the excitement of the imagination and of the emotions, to the neglect of the intellectual powers and moral sentiments; too great devotion to music, and the perusal of exciting novels; the various means by which the feelings are awakened, and acute sensibility is promoted, whilst every manifestation of either is carefully concealed; and studied endeavours to dissemble desires which struggle to be expressed,—all serve, especially at a period when the powers of mind, and the conformation of the body are approaching development, to produce that state of the nervous system, of which hysteria is one of the most frequent indications. About the period of puberty in females, various circumstances connected with their education tend to weaken their constitution, to excite their emotions and desires, and to cultivate their imaginative and more artificial faculties, at the expense of their reasoning and moral powers. Whenever numbers associate previous to, or about the period of puberty, and especially where several use the same sleeping apartment, and are submitted to a luxurious and over-refined mode of education, some will manifest a precocious development of both mind and body; but in proportion to precocity will tone and energy be deficient, and susceptibility and sensibility increased. In these circumstances also, organic sensibility, particularly as relates to the uterine system, often assumes a predominance powerfully predisposing to hysterical affections. There can be no question, although the subject has been but rarely approached by British medical writers, that indulgence in solitary vices and sexual excitements, is not an infrequent cause of this, as well as of other disorders. Numerous writers have insisted upon the propriety of giving due consideration to this source of mischief, as well as to the ennui and chagrin attending celibacy and continence. I agree with Dr. CONOLLY, in believing that English practitioners pay perhaps too little attention to these and other related circumstances; and that, in a country where the passions and emotions are so carefully suppressed, or concealed, they sometimes seem to forget their silent operation on the frame, and charge the medical writers of other countries with being somewhat fanciful and extravagant.

50. c. Besides the above, there are various circumstances connected with the *social state*, that tend to develop these conditions of the uterine organs and nervous system, in which hysterical disorder originates. M. GEORGEZ remarks, that the progressive steps of life, as youth passes away, are sources of painful moral affections, especially to the frivolous, the vain, and the unmarried of the sex. These affections increase the susceptibility of the nervous system, and, with numerous other circumstances yet to be mentioned, dispose to the nervous disorders of the more advanced epochs of life. There can be no doubt, that pampered modes of living; an early or habitual indulgence of temper, or of the emotions and desires; the use of wines and liqueurs, even within what may appear the bounds of moderation; late hours, and late rising; insufficient modes of exercise, or the want of it, and of pure air; neglect of the requisite exposure to light and

* M. BRACHET, in distinguishing between hysteria and hypochondriasis, says that the former is a spasmodic affection of the cerebral nervous system, to which he has given the name of *cerebral neurospasm* (*neurospasme cérébrale*), and that the latter is a disorder, a vitiation, an aberration of the two nervous systems, which he denominates *cerebro-ganglionic* (*neurotase cérébro-ganglionaire*). Then he infers that there can be no identity as to seat or affection between these two diseases; for the one is a spasmodic affection of the cerebral system only, and the other is an ataxy of the two nervous systems. He moreover states that there is no farther analogy between them, than the participation of the cerebral nervous system in the two maladies; but that, in hypochondriasis, the ganglionic system is equally compromised. Hence, 1st. They are not identical affections:—2d. They differ in their seat and nature; the phenomena in the one being spasmodic; in the other, vitiation of function.

sunshine; and sedentary occupations, particularly in over-heated and crowded apartments or factories, more or less predispose the female constitution to this affection. Some writers believe that the use of tea and coffee has a similar effect; it is possible that the former, especially green tea, taken too frequently or in excess, will weaken the nervous system; and that the latter will sometimes excite the uterine organs. The influence of climate is not very manifest; temperate and changeable regions certainly furnish more numerous instances of nervous disorder in females, than very warm or very cold countries; but as much is probably owing to the state of manners and society in the former, as to climate. Even dress has some effect in the production of hysteria; inordinate compression of the waist by stays not only weakens and displaces the digestive organs, but favours local determinations and congestions, and deranges the uterine functions.

51. *d. Previous disorder* more frequently predisposes to hysteria, than other circumstances, for many of those already noticed induce other complaints, before hysteria, in any of its forms, is manifested; and these complaints constitute merely that state of predisposition, which only requires the occasion or exciting cause of its appearance. The various disorders of MENSTRUATION (see that article), determination of blood to, or congestion, or irritation of any of the uterine organs, may exist, and yet no hysterical affection take place. The nervous system also, both ganglial and cerebro-spinal, may be susceptible and morbidly sensible, and yet none of the phenomena constituting hysteria may appear. These, as well as some other morbid states, frequently constitute only the predisposition, which, however, will readily burst into open disease, when one or more of the exciting causes come into operation. Whatever exhausts organic nervous power will increase susceptibility and irritability, and thus constitute that mobility of the system, and disposition to local determinations and congestions, justly insisted upon by Dr. Cullen, as being connected with the pathology of the complaint. The susceptibility arising from exhaustion by acute disease favours the appearance of hysteria, especially during early convalescence. The approach and presence of the catamenia have also some influence, both as a predisposing and an exciting cause.

52. *Gastro-intestinal disorder*, or irritation, has been justly viewed by numerous writers, as a predisposing cause of hysteria, and particularly insisted upon by Broussais and his followers. Although this writer has doubtless exaggerated the influence of this morbid condition, and imputed to it phenomena depending chiefly on debility and augmented organic nervous sensibility, yet it is nevertheless often present, associated, however, with other morbid states, as those just named, and with impaired action and flatulent distention of the digestive canal. In some cases also, the gastro-intestinal disorder is almost coeval with, and purely a complication of, the hysterical affection. But it is much more frequently observed, that numerous circumstances tending to disorder the digestive mucous surface, especially errors in diet, as respects both food and drink, and various symptoms indicating impaired or disordered digestion and fecation, have preceded for a

longer or shorter period the development of the hysterical disorder. Still it must be admitted, that the symptoms referred to the alimentary canal, especially impaired function, flatulent distention and borborygmi, and altered sensibility, are greater indications of debility of the organic nervous system, than of inflammatory irritation of the gastro-intestinal mucous membrane. Nor should it be overlooked, that disorder of the uterine organs, seated not merely in the nerves, but affecting also vascular action in these organs, may exist without exciting painful sensations, and yet sympathetically disturb the digestive canal. Thus we perceive the changes produced in the uterine system by impregnation displayed chiefly in the digestive organs and nervous system. Even the errors of diet, and the desire for various improper or indigestible articles of food and drink, which has been attributed to disorder of the alimentary canal, may be actually occasioned by changes originating in the uterine organs. These substances, however, by increasing the disorder of the digestive tube, will aggravate or perpetuate the primary affection of the sexual organs. There can be no doubt, that whatever weakens organic nervous power, in all disorders of the gastro-intestinal viscera necessarily do, will both dispose to, and increase, hysterical complaints.

53. It has been supposed by some writers, that the females of gouty parents are more prone than others to hysteria. This may be partly accounted for, by deficiency of constitutional energy derived from the parent, and greater susceptibility of the nervous system, as well as by the circumstances alluded to above (§ 49.).

54. *ii. Exciting Causes.* — Certain of the predisposing causes may of themselves occasion the complaint, when more than usually active, especially disorder of the uterine organs, or of the digestive canal. Excitement of the nerves of the uterus or ovaria, or irritation of them, particularly in connection with any irregularity of menstruation; inflammatory action, of an acute, subacute, or chronic nature, of the vagina, or of these organs; congestion, structural lesion, tumours, polypi, &c., of the uterus, and leucorrhœa, not infrequently occasion hysteria. Although this disorder is very often connected with excitement, or even with inflammatory irritation in the ovaria, yet it is seldom symptomatic of fully developed ovarian dropsy. It is not improbable, that this latter malady proceeds from a state of impaired tone, or is associated with a condition of the organic actions in these parts, incompatible with the production of the hysterical paroxysm. Irritation of the gastro-intestinal mucous membrane, by stimulating or acrid ingesta, particularly such as act upon the colon and rectum, as large doses of aloes, colocyth, &c.; morbid secretions, mucous sordes, and fecal collections in the large bowels; the irritation of worms, especially of ascarides, in the rectum—the *Hysteria verminosa* of SAUVAGIS; the use of stimulating or acrid glysters; and hæmorrhoids, sometimes excite one or other of the forms of the complaint. Excessive discharges and hæmorrhages, particularly prolonged leucorrhœa, diarrhœa, abortions, uterine hæmorrhage, and protracted suckling, on the one hand; and on the other, the suppression of discharges, as of the catamenia, of the lochia, and of leucorrhœa; long or extreme suffering from pain; mental or bodily

fatigue; and even irritation of remote parts, as that connected with cutting the wisdom teeth, occasionally induce a seizure.

55. Mental affections and excitements, especially those which act upon the uterine system in particular, disappointments in love, unreturned and spurned affections, jealousy, anger and other violent emotions; protracted expectation, longings after objects of desire, tragic representations, frights, the sight of objects, disgusting or distressing, or disagreeable from peculiar mental diathesis, and intelligence of a distressing or of an exciting nature, suddenly communicated, are the most common occasions of hysteria, as respects both its first appearance, and its subsequent recurrences. Several of these emotions affect the uterine organs, the affection being afterwards reflected upon the nervous system generally. Premature or physically incongruous marriages; excited, but unsatisfied, desires; celibacy, and venereal desiderium inane, are also not infrequent causes of the complaint. FRANK remarks, that "*Cochleum vitæ plures sine noxi ducere possunt formæ, sed vix unam illarum invenies, quæ prope maritum impotentem impune decumbere possit. Idem de uxibus, a maritis neglectæ, valet.*"—There is no doubt, that the sight of others in the fit will sometimes produce an hysterical seizure. I have myself witnessed this on two or three occasions; and in one of these, two females were attacked from this circumstance. This phenomenon has been imputed to imitation; but it may with equal propriety be assigned to sympathy, to fear, &c. Probably more than one of these feelings are concerned in producing it. Severe mental distresses, or extreme joy, may also occasion some one or other of the forms of the complaint. Immoderate fits of laughing produced by humorous or ridiculous occurrences, or crying caused by vexation or contrarieties, may also pass into the hysterical paroxysm. I have no doubt of the fit being often renewed at pleasure, almost as readily as tears may be shed, by recalling or adverting to various feelings, emotions, or circumstances; and I have even seen instances which have convinced me of the fact. Electrical and warm states of the air, and sudden vicissitudes of temperature, have been supposed sufficient to produce a seizure. The influence of spirituous or vinous potations, of stimulating diuretics, and of substances which excite or irritate the urinary bladder, in the production of the complaint, is much less doubtful than that of atmospheric temperature; but the close, warm, and impure air of crowded rooms and assemblies, particularly in connection with excited feelings or contrarieties, very often occasions an attack, especially in those who have previously experienced it. A similar effect is in rarer instances produced by various odours, especially in peculiar idiosyncracies. ICHERMORE states that the fit has been often induced by the odour of musk.

56. IX. PATHOLOGY. — The nature of hysteria may be in a great measure inferred from what has already been stated respecting its symptoms and causes; yet something more explicit still must be advanced on this subject. As simple and pure hysteria is rarely or almost never fatal, and as we therefore have hardly ever an opportunity of examining the state of the principal viscera of patients who had been subject to this complaint,

unless they have died of some intercurrent or associated malady, so proofs have been wanting in support of any of the doctrines proposed as to its nature, and a very wide scope allowed for vague hypothesis. The ancients and many of the moderns referred hysteria to the womb; and hence the origin of the name. The ancients, however, ascribed properties, powers, functions, and motions to the uterus, which modern knowledge has shown to be erroneous; yet I am disposed to believe that this organ, influenced as it most probably is by the nervous and vascular states of the ovaria, performs a very important part in the economy; and that this is not confined to alterations merely of its organic sensibility, but that it extends frequently to its contractility, and to several related organs.

57. Some recent writers have ascribed hysteria to irritation in the uterus, in the intestines, in the brain, or even in other internal viscera, occurring in delicate, nervous, or susceptible persons. DR. CONOLLY remarks, that in all cases of hysteria there is a disordered state of some part or the whole of the nervous system; and that, although this state may be, and very frequently is, induced by uterine irritation, it no less evidently arises, in other cases, from causes productive of irritation in other parts of the body, and also from causes acting directly upon the mind. That more or less susceptibility, original or acquired, characterises the state of the nervous system in hysterical persons will not be disputed: yet even in such persons, the usual exciting causes, or irritations of different viscera, will not occasion true hysterical symptoms, unless they previously affect the state of organic nervous influence, or of circulation, in the sexual organs.

58. WILLIS ascribed hysteria to disorder of the brain, and M. GEORGET has recently adopted the same view, which has been most ably and satisfactorily overthrown by M. FOVILLE. Still more recently MR. TATE has contended that hysteria arises from a morbid state of the spinal cord, connected with disorder of the womb; but, as I have already remarked, this "morbid state" is but a vague generic term, and that, most probably, even when it is most prominent, more of altered sensibility than of vascular or structural lesion, of this part of the nervous system constitutes its essence. However this may be, attentive observation of the morbid phenomena, especially at their commencement, will show that the spinal affection is merely a consecutive and contingent disorder, and one by no means generally, or even very frequently, observed. This want of precision in the use of terms, and in the ideas relating to the pathology of hysteria has been surpassed by M. ANDRAL, when he says, "As to my opinion respecting the seat of hysteria, I repeat, that it is a nervous complaint, and that its seat is the nervous system!"

59. Although the uterus and its appendages have been viewed as the chief source of hysteria, both by the ancients, and by most of the moderns, yet some difference of opinion exists as to the nature of this primary affection. PINET, VILLERMAU, LOUSTIN, and FOVILLE consider that it is entirely nervous, or is an excited state of the nerves supplying the organs of generation. Other writers, as ANDERSON, &c. who have adopted the term uterine irritation, seem to ascribe to this

term a similar meaning to that which the above author* have wished to convey; although they contend, that, in connection with this state, the uterine functions are very often disordered. M. PEROL, on the other hand, infers the existence of chronic inflammatory action of the uterus, as the immediate cause of the complaint. Inflammatory action in its various grades, from simple erythysm upwards to the most acute vascular change, may sometimes be a complication or cause of hysteria; but there is no necessary dependence of the one upon the other; for we often meet with *metritis*, without hysterical symptoms, and still more frequently with fully developed hysteria, without any evidence of metritis. Yet it should not be overlooked that the former is often symptomatic of, or complicated with, the latter.

60. When we consider the number and importance of the nerves of the female organs of generation; the connections existing between them and the nerves supplying the kidneys, the urinary bladder, and the intestinal canal on the one hand, and the spinal and sacral nerves on the other; and the fact that these nerves are small and apparently few in girls, large and numerous during the epoch of uterine activity, and very small in old women; the sympathetic effects of irritation, excitement, or of erythysm of them will be more readily recognised, and the relation of these sympathies to their source made more obvious. Attentive observation of the causes of hysteria, and of their more immediate effects upon the generative system, and a knowledge of the sensations of the patient with reference to the origin and course of this ailment, will prove, that the old opinion as to its source is correct. That the primary affection is seated in the nerves of the generative organs, and that it consists chiefly of excitement, erythysm, or irritation, sometimes, however, associated with congestion or vascular determination to the uterus, or with disorder of the catamenia, are shown by the circumstances in which it is observed, and the fact that it never appears until these nerves have approached their full development, nor after their principal functions have ceased. GILBERT, however, contends in opposition to this opinion, that organic lesions of the uterine organs are very common in females, who have never had hysteria; and that the more serious changes, as cancer uteri, uterine polypi, ovarian dropsy, &c., are seldom accompanied with this complaint. But the most of these maladies do not appear during the epoch, in which hysteria is most common. As long as the uterine functions and sympathies are active, hysteria will occur. Hence its not infrequent connection with metritis and other uterine diseases, during the prime of life; but when these functions and sympathies are exhausted or greatly enfeebled, as in most of the dangerous maladies and organic lesions of the uterus and ovaria, as well as in advanced life, hysteria will not be developed. The generative nerves have then become incapable of experiencing that state, and of exerting that influence upon the nerves related to them, which are requisite to the production of hysterical phenomena. As M. FOVILLE has justly observed, we do not find sexual ardour amongst the symptoms of malignant alterations of the testes, or of hydatids in the spermatic cord, &c. Hysteria does not occur in aged females, for

the very same reason that menstruation and pregnancy do not take place in them. The belief that hysteria may affect males has been adduced against its uterine origin; but the fact of true or unequivocal hysteria having been met with in males, needs further confirmation; or rather the nervous affections, resembling some states of hysteria, noticed in this sex, require a closer observation than they have hitherto received. I will not, however, deny, that irritation of the male sexual organs will not occasionally produce disorder, in many respects similar to that observed in females in like circumstances, particularly in susceptible and nervous persons.

61. My views, therefore, as to the *pathology of hysteria* are as follows:—*a.* That hysteria arises from the state of the organic nervous influence endowing the generative organs of the female, and that a similar state of the sexual organs of the male very rarely occasions it, and then only in peculiar circumstances;—*b.* That this state of nervous influence nearly approaches to, or consists of, excitement, nervous erythysm or irritation, or is of an active or sthenic kind, as respects the functions of these organs;—*c.* That this is generally attended by vital turgescence of the vessels of the uterine system; and these states, consequently, occur chiefly during the prime of life, or whilst the nerves of generation and the uterine circulation possess their functional energies;—*d.* That these conditions of nervous influence and circulation in these organs are generally insufficient of themselves to occasion the fully developed complaint; and that, in addition, there are increased sensibility and irritability of the sentient and motive systems, and consequently augmented susceptibility of impressions, from mental or physical causes, arising either from original conformation, or from acquired habit or diathesis;—*e.* That when these states of the generative organs are excited by mental emotions or by other circumstances, the affection is propagated by direct or immediate sympathy,—by the organic nerves,—to the digestive tube and urinary organs on the one hand, and to the cerebro-spinal nervous system on the other; and thus the phenomena constituting the hysterical seizure are developed;—*f.* That the hysterical phenomena, proceeding from *direct sympathy* with the uterine organs, consist chiefly of those referred to the bowels—the borhorygmi, globus, &c., and to the urinary organs, as the increased secretion of urine, &c.;—*g.* That the extension of the disorder of the uterine nerves, by means of the ganglial system and its communicating branches, to the roots of the spinal nerves, gives rise to the symptoms depending upon *reflex sympathy**, especially the convulsions, pains, &c., and the affections of the respiratory organs, throat, head, &c.;—*h.* That the phenomena of the developed states of the disease and of its irregular forms are principally sym-

* In my APPENDIX to M. RICHERAND'S *Elements of Physiology*, published in 1824 and in 1825, I have divided the sympathies into—1st. The *Reflex*, or those which take place in consequence of irritations conveyed by the nerves to the cerebro-spinal centres, and thence reflected upon motive or sentient parts;—2nd. and, 3dly. The *Direct*, or those which proceed more immediately from the seat of primary excitement to other parts, by means chiefly of nervous communication, continuity of membrane, structure, &c.—These views as to sympathy, which are certainly original, were applied to the explanation of the pathology of CROURE, and its related disorders of CONVULSIONS, EPILEPSY, &c.

pathetic, and of the kind which I was the first to denominate the *reflex* (see *Notes and Appendix to RICHIERAND'S Elements of Physiology*, pp. 34. and 546.); and the same views and pathological explanations given in the articles CHORÆA AND RELATED AFFECTIONS (§ 15—17.), CONVULSIONS (§ 46.), EPILEPSY (§ 51.), apply to the different varieties of HYSTERIA;—i. That, although hysteria is often connected with deficient or irregular menstruation, yet this function is sometimes excessive, or is occasionally regular, in every respect, in hysterical persons.

62. X. TREATMENT. — There are few diseases less under the control of medical treatment than hysteria; and various circumstances connected with it often occur to render the management of it not only unsatisfactory, but also unpleasant. Patients themselves or their friends readily suppose that relief should quickly follow a recourse to medicine, and conclude, that the proper means have not been employed, when relief is not obtained. They do not consider, — and the fact is generally not sufficiently explained in the proper quarter, and at the proper time, — that the complaint arises from causes which are mostly permanent in their action, or which continue during the treatment, and that in every case the difficulty of removing an effect, whilst the causes are in operation, is very great. The candid physician also readily admits, that the complaint in its various forms is devoid of danger, and thus circumstance is believed by many to imply a speedy cure. Several varieties of it also are calculated to excite alarm; and, if they be not soon removed, the knowledge or ability of the physician, under whose care they may have come, is impeached; and some other advice is asked, and often in quarters noted neither for honesty nor ability. If the patient should thus fall into the hands of either the qualified or the unqualified charlatan, the complaint is misrepresented or exaggerated, and alarm is excited. The effect, however, is often beneficial, although it was as little intended as its source was unsuspected. The impression of fear on the mind may put a stop to some of the causes, or may interrupt the succession of morbid sympathies. The patient, moreover, after she has passed from the care of the scientific practitioner, may be subjected to influences of a powerful nature, moral or physical, or both, and experience temporary or some permanent advantages from them; but from whatever source they proceed, or by whomsoever administered, — whether by the medical empiric, or by the spiritual comforter — the modern worker of miracles, — the results are often equally annoying to the duly qualified practitioner. The regular professor of medicine is expected to administer benefit in all cases, and without regard to circumstances. If he fail, and the patient, under very different circumstances and influenced by very different feelings, receive benefit from the manipulations of a charlatan, whose means are more striking or imposing, or more suited to the moral condition of the patient, than those previously employed, the occurrence is made a matter of notoriety, and equally to the disadvantage of the one, as to the credit of the other. The former is expected by the public to cure, and it is considered discreditable for him to fail; the latter is viewed as having made a wonderful discovery, if he succeed

but in a single case, and his knowledge is supposed to have come by inspiration, as it could not have been derived from any other source. Another circumstance further serves to counteract the treatment advised by scientific men, particularly in large towns. The patient is capricious, and her friends are often equally unstable. If benefit is not received in a very short time, the advice of some one else is obtained, and before he can be of any service, he also is dismissed, and a third is called in. Thus, from twenty to thirty practitioners may be consulted without one of them having had a sufficient opportunity of fulfilling: single intention of cure. Now, what is the consequence? The patient resorts to some noted or fashionable empiric, who is informed, of her long sufferings, and the want of success of the greatest physicians in her case. He is shrewd enough to see at once the state of matters, and to turn them both to his pecuniary advantage and to his credit. He exaggerates the risk, the difficulty, and the consequences of the disease; refuses to undertake the case, unless at his own terms, which he takes care to secure; and he thus also secures the continuance of the patient under his care, and even her confidence, although he should fail in all beside.

63. From the dishonest acts of charlatans, useful lessons may, however, be honestly learnt. When a physician is called to a nervous patient, who has been under the care of other physicians, instead of prescribing at once, and without reference to this circumstance, he should acquaint her or her friends, that probably a sufficient opportunity of affording relief had not been allowed to those who had preceded him; that, as a member of an honourable profession, he expects to be honourably dealt with, and that he will not compromise his reputation by prescribing for the case, unless he be allowed time and opportunity — fully and circumstantially — for its proper treatment. Unless these be conceded, and in a spirit which will promise to secure their due performance, it will be infinitely better to relinquish the case altogether, than to enter upon the treatment of it, with the probability of disappointment. When it is found that the physician thus regards his own reputation, respect and confidence will be accorded to him by the patient and her friends.

64. There are various circumstances in the pathology of hysteria, which require strict attention in the treatment. — 1st. The particular form of the hysterical seizure, whether regular, irregular, or anomalous; — 2d. The condition of the nervous system, particularly with reference to increased sensibility and irritability; — 3d. The excitement, erethism, vital turgescence, or other disorder of the uterine system, and their influence by *direct* and *reflex sympathy*; — 4th. The states of the vascular system, in connection with these, especially in respect of *plethora*, general or local, or of deficiency of blood; — and, 5th. The functional or other disorder of the digestive canal. Of all these, the most important is the state of uterine function; for unless the symptoms connected with the generative organs be carefully ascertained, as far as is proper to inquire, and the disorder in this quarter be carefully inferred, the treatment will often be unsuccessful; and, even with the utmost exercise of professional acumen, we may fail, more or less, owing to the permanence of the moral and physical causes of the complaint.

65. i. TREATMENT IN THE SEIZURE. — A. If the paroxysm be attended by severe convulsions, the principal intention is, to preserve the patient from injuring herself; the next is, to shorten its duration. — a. Although her struggles are severe, she generally retains sufficient consciousness and even volition, to avoid danger. Therefore little effort should be made to restrain them, and especially as they have upon the whole a beneficial effect, particularly in equalising the circulation. If, however, the fit assumes an epileptic character, this object should be carefully attended to, and a folded napkin placed between the teeth, if it be required. In all cases, the patient should be removed to an airy apartment, and the clothes loosened around the waist, chest, and neck. — b. In order to shorten the fit, various means have been recommended, and found more or less serviceable. If the patient is able to swallow fluids, a large cup full of cold or iced water may be given and repeated. If the seizure be more severe, or be attended by general or cerebral plethora, the affusion of cold water on the head and neck should be resorted to, or cloths wet with it, or with an evaporating lotion, should be placed around the head. If the severity of the spasms, particularly of the muscles of the face and jaws, and of the strangulating sensation arising from the globus, prevents deglutition, enemata will be found of great service. The substances which I have found most efficacious, when thus employed, are, the spirits of turpentine alone, or with castor or olive oil, *assaftetida*, and *camphor*. An enema of the coldest spring water also puts an instant stop to the convulsions. The spirit of turpentine was recommended by me in 1821 (*Med. and Phys. Journ.* vol. xvi. p. 107. 185.), in these cases. From half an ounce to an ounce and a half of it, may be thus administered, with either of the oils just named, in any vehicle, as gruel, milk, broth, &c. As the patient's consciousness is seldom lost in the seizure, the influence of fear in arresting it has been often resorted to, and frequently with complete success. Even mention of the affusion of cold water has put a stop to the fit. Yet instances have occurred in timid persons of great nervous susceptibility, where fear has aggravated the convulsions.

66. B. Where there is neither cerebral plethora nor difficult deglutition, the internal use of diffusible stimulants, as the preparations of *ether*, of *ammonia*, of *valerian*, of *assaftetida*, &c., have been very generally recommended, and are often useful, combined, according to circumstances, with one another, or with *anodynes*, as *laudanum*, *henbane*, *hydrocyanic acid*, &c.; the smoke of burnt feathers, and the odour of *assaftetida*, of mint, of the volatile alkali, of aromatic vinegar, &c., are the common domestic means for the removal and prevention of a seizure. Much, however, particularly as respects the prevention of the fit, depends upon the patient herself. Most females, subject to the complaint, give way to the current of their feelings, until the paroxysm is developed, although a determined resolution to prevent or suppress it would often prove successful. Diffusible stimulants are not so generally useful in preventing, as in shortening, the attack. The former of these objects is more certainly obtained by a draught of cold water, or by an enema of the same, or, by cold applications to the head,

than by other means. Dr. CONOILLY states that he has found half a drachm of *ipecacuanha* prevent the seizure. Any of the other substances already recommended to be used in enemata, for the purpose of shortening the fit, will generally also prevent it.

67. C. The more severe or alarming states of the fit, as the comatose, the cataleptic, &c., are most benefited by the affusion of cold water on the head, or by the application of cold lotions in this quarter. Vascular depletions are seldom necessary during the fit, even in these cases, unless the attack has followed the suppression of accustomed discharges; or the temperature of the head, and the action of the carotids show the propriety of prescribing them, and even then a moderate bloodletting, or cupping on the nape of the neck, will be sufficient. Warm and rubefacient *pediluvia*, and other derivatives from the head, may also be employed in these cases. The means which may be further resorted to will be stated hereafter (§ 71. 75. 97.).

68. ii. GENERAL TREATMENT, PARTICULARLY IN THE INTERVALS. — A. With reference to the state of the uterine system. — The female organs of generation may be subject to that state of excitement, *erethism*, *turgescence*, or irritation, which, in susceptible and nervous persons, seems intimately connected with hysteria, without the catamenia being in any way disordered. More commonly, however, this discharge is scanty, difficult, painful, or irregular as to time, quantity, and character. In a few instances it is suppressed, or nearly so; in others it takes place at intervals of two or three months; in some it is too profuse, or much too frequent, and in many it is pale and branniform, or it presents appearances more fully described in the article MENSTRUATION. But all these states are usually accompanied by more or less of altered sensibility, referrible to the uterus or ovario: there is often pain behind or above the pubis, in the lower part of the sacrum, or in the loins, or in the hips or tops of the thighs; the excretion of urine is disturbed, or too frequent, or attended by slight scalding, &c.; and there is sometimes leucorrhœa, with tenderness of the os uteri on examination, and occasionally an unpleasant sense of heat in the vagina. All these indicate the propriety of having recourse to local depletions; yet, unless the patient be plethoric, or the discharge has been scanty or suppressed, a very copious vascular depletion is often injurious. A moderate cupping on the sacrum; or the application of ten or twelve leeches to the groins, two or three days before the expected return of each monthly evacuation, or to the hypogastrium, will generally suffice. If the depletion be more liberal, the employment of tonics and of other means to improve the general health must not be neglected.

69. All the symptoms just noticed as indicating irritation of the uterus, are often present, even in the severest form, where there is great constitutional debility, and, in a few instances, where the colour of the surface and of the lips, and the states of the pulse and of the veins, indicate more or less *anæmia*. In these, even local depletions may be hurtful. The chief dependence must therefore be placed in preventing local excitement or irritation, in the use of cooling tonics sometimes in conjunction with *anodynes* and *sedatives*; and in improving the digestive functions and general health, by

suitable diet and regimen. The *sulphates of iron*, of *zinc*, and of *quinine*, are severally of use, in combination with small doses of *camphor*, or of *ipeacacuanha*, and with *extract of henbane*, or of *hop*. If these should occasion *headach*, or increase the tenderness in the vicinity of the uterus, the *infusum* or *decoction of cinchona*, or the *infusion of valerian* with *nitrate of potash*, or *hydrochlorate of ammonia*, or *carbonate of soda*, may be prescribed. When the bowels require to be opened, the *cooling aperients*, as the *bitartrate of potash*, with the *nitrate*, and the *confection of senna*, should be preferred. Moral and physical *quietude*, frequent reclining on a couch, and a digestible and cooling diet, ought also to be enforced. In more plethoric persons, these means are still more requisite than in the preceding; and, instead of *chalybeates* and *tonics*, *cooling diaphoretics*, particularly weak *camphor mixture*, with solution of the acetate of ammonia, *nitrate of potash*, and *spirits of nitric æther*, will be often taken with benefit. Wherever uterine *turgescence* or *crethysm* is inferred, the treatment must be directed with reference to the states of general or local *plethora*, and of nervous power, as hereafter insisted upon; and hot spices, exciting articles of food, and stimulating beverages, should be avoided. Heating purgatives and irritating injections ought not to be employed. A separate sleeping apartment should be suggested.

70. When the catamenia are disordered, the treatment must be directed with strict reference to the state of disorder, as explained in the article *MENSTRUATION*. If they be *excessive* or *too frequent*, *tonics* and *astringents*, with *refrigerants*, and *anodynes* or *narcotics*, are generally requisite; but the predominant use of either of these classes of remedies should depend upon the peculiarities of the case. In these cases especially, advantage will accrue from *cold sponging* the loins, abdomen, and hips, every morning with an *astringent lotion*, as with equal parts of *rose water*, solution of the acetate of ammonia, and *vinegar*; from the occasional recourse to an *enema of cold water*, particularly when a seizure is threatened, or to *emollient* and *anodyne enemata* on other occasions; and from rest in the horizontal posture. The *cold plunge* or *salt-water bath*, or *shower bath*, will often also be of service.

In the other states of disordered menstruation, the treatment should be directed according to the principles stated above (§ 68, 69.).

71. B. With reference to the state of nervous susceptibility and tone. — The increased susceptibility of the nervous system generally characteristic of hysteria is frequently associated with more or less debility, and increased irritability of the moving fibre, — or in other words, with mobility of the muscular system; and to this state, whatever may be other morbid conditions, should the treatment be in some measure directed. Yet the means which are the best calculated to correct this state are by no means obvious: for if it be associated with vascular *turgescence* of the uterine system, or with general *plethora*, *antispasmodics*, *chalybeates*, and other heating *tonics* may increase the complaint, although they will generally be of service in an opposite state of the vascular system. In general, therefore, the condition of the sensibility and irritability should be combated chiefly by frequent and *regular exercise* in the open air, by *early rising*, by *sleeping in large airy apartments*, by *cold or salt-water bathing* or the *shower bath*, by

cold sponging the surface of the body, by a proper conduct and employment of the mind, and by a correct management of the passions.

72. Dr. CULLEN very justly remarks, that *tonics* may be of service when the disease depends upon general debility; but as a *plethoric state*, especially of the uterus, is more or less joined with hysteria, the frequent or long continued use of them may do harm. They should be confined to cases of pure mobility, particularly with a periodical recurrence of the seizure; and then the selection of them ought to be determined by the peculiarities of the case. In many such, the preparations of *cinchona* or of *valerian*, with the *nitrate of potash*, or *carbonate of soda*; the *sulphate of quinine* or of *zinc*, with small doses of *camphor*; the *infusion of bark*, or of *roses*, with one of the *mineral acids*, and the *tincture of the sesquichloride of iron*, will be most serviceable. In some cases, the addition, to either of these medicines, of an *antispasmodic*, as of the compound spirit of *sulphuric æther*, the *tincture of valerian*, &c.; and of an *anodyne*, as *henbane*, *hydrocyanic acid*, &c., according to the other substances selected, will be further advantageous. When hysteria affects *plethoric habits*, and is connected with manifest signs of *turgescence* of the generative organs, *opium* is injurious. But, in other circumstances, it is often of service, particularly when conjoined with *camphor*, *aromatics*, or with some of the substances just named, but even then it should only be occasionally employed. When narcotics have not been previously resorted to, the preparations of *hop* will be found useful, if general *plethora* be not present.

73. C. With reference to the states of the vascular system. — The connection of hysteria with vascular *plethora*, general or local, is often obvious; and has been very judiciously viewed by Dr. CULLEN. The usual practice of removing this state by *bloodletting*, he remarks, is often precarious; for sometimes, instead of preventing, it will indirectly induce or increase vascular fulness. Besides, if depletion be carried too far, the complaint may be thereby increased. "Vein-section therefore may either increase the plethora, or induce inanition; and it is only to be used in recent cases; and where there is manifestly a full habit." A *spare diet* and *regular exercise*, particularly in the open air and in the light of day, *early rising*, and *cooling aperients*, are the means upon which the chief reliance ought to be placed in removing this state, and especially as they tend also to strengthen the nervous system, and to prevent local *turgescence* and irritation. The frequent association also of *dyspepsia*, and of *gastro-intestinal disorder* with hysteria, renders this regimen still more necessary. When depletion, however, is indicated by the *turgescence*, or chronic inflammatory state of the uterine organs, or by impaired or obstructed menstruation, it should be practised in the manner already advised (§ 68.).

74. When the vascular system is deficient, rather than too full, of blood, and when this fluid seems thin or poor (the *Hysteria chlorotica* of Sauvages), then *tonics*, especially the preparations of *iron* and *chalybeate mineral springs*, will be most beneficial; but they should be aided by air and exercise, and the other means already advised for improving nervous energy (§ 71.). The *sulphate of iron* with the *extract of hop*, or with the compound galbanum, or with the compound aloetic

pill, according to the states of the bowels and of the catamenia; the compound mixture of sison, &c.; and a moderately nutritious or milk diet, will be eminently beneficial in these cases. If the patient complain of weakness in the loins and limbs, a large plaster of the red oxide of iron, or the aromatic plaster, should be worn on the lumbar region, in addition to the employment of the other means already recommended.

75. *D.* With reference to the state of the digestive organs.—Irritation of the digestive mucous surface, in connection with hysteria (§ 52.), is often most successfully treated by a mild spare diet and moderate exercise in the open air. If the patient be plethoric, or complains of pain or soreness, or of tenderness of the epigastrium, abdomen, or hypogastrium, local depletions, particularly the application of leeches on the abdomen, and cooling diaphoretics, with external derivatives, will be appropriate, as respects both the digestive and the hysterical disorder. If the bowels be costive, the cooling aperients (F. 96. 790.), or the preparations of rhubarb with ipecacuanha, calcined magnesia, or castor oil, will be useful. If they be relaxed, the *hydrargyrum cum creta*, with rhubarb and ipecacuanha,—or this last with the extract of hop, or of poppy; and refrigerants conjoined with demulcents, will be serviceable. In cases of hysterical colic, and of irregularity of the bowels in hysterical persons, a frequent recourse to *enenata*,—to those consisting of cold or of emollient fluids, and sometimes of cooling aperients,—will generally prove of great benefit.

When the catamenia are at the same time disordered, clysters containing the spirit of turpentine are frequently very useful. The state of the digestive organs often requires tonics and stomachics; but these remedies may prove too stimulating, unless they be given with refrigerants and antacids, as with the nitrate of potash, and the carbonate of soda. Aloetic and heating or acrid purgatives, particularly those which excite the rectum and large bowels, are sometimes injurious. The propriety of exhibiting them, even when hysteria is associated with scanty or obstructed catamenia, is occasionally even doubtful, particularly when general or local plethora, or excitement is present, unless these have been removed by suitable depletions; and then the compound decoction of aloes, with a little of the solution of potash, may be preferred. When flatulence is distressing, as it often is, the treatment should altogether depend upon its connection with gastro-intestinal irritation, or with uterine excitement or turgescence. In the former case, the means just stated should be prescribed, aided by the application of a large subefacient plaster, or the compound galbanum or pitch plaster, on the stomach or abdomen. Mint water with calcined magnesia, and an aromatic or carminative, or the infusion of *columba*, or of *chryta*, with the carbonate of soda and compound tincture of cardamoms, will generally also be serviceable.

76. *iii.* TREATMENT OF THE IRREGULAR AND COMPLICATED STATES:—The intentions of cure in these states of hysteria, are,—1st, To remove existing disorder in the uterine and digestive organs, or in the cerebro-spinal centres;—2dly, To allay the local affection, by means appropriate to its peculiar characters;—and, 3dly, To make a forcible impression, mentally and physically, on the nervous system, so as to allay the primary nervous affec-

tion, and to break the chain of nervous sympathy. These intentions are severally more or less applicable to all the nervous states about to be noticed; but a great difference will be shown to exist in the modes or means of their fulfilment, and in the dependence to be placed upon them individually.

77. *A.* The painful affections depending upon this complaint, or arising from irritation or turgescence of the uterine organs, influencing sympathetically (§ 13.) related or distant parts, require means, in some cases at least, different from, or additional to, those already mentioned.—*a.* The treatment of Hysterical headache is fully stated in the article HEADACHE (§ 40.).

78. *b.* Pain in the left side of the thorax, simulating pleuritis, or pericarditis (§ 15.), is difficult to remove, especially if there be tenderness in the dorsal portion of the spine, and disorder of the uterine functions. If the catamenia are scanty, and especially if there be more or less vascular plethora, cupping on the loins or sacrum, or the repeated application of leeches to the loins, and cooling or mild purgatives, will be necessary. In other circumstances, and in such cases, after these means have been employed, the effects of antispasmodics and of narcotics may be tried, especially of camphor or ammonia, with valerian or assafoetida and henbane, &c.: If the pain be attended by palpitations of the heart, &c., the decoction of senega may be prescribed with mint or orange-flower water, carbonate of soda, and tincture of henbane;—or camphor may be given in a mucilaginous mixture with hydrocyanic acid. Immediate relief is often obtained by applying on the pained part a piece of flannel wrung out of hot water, and sprinkled with spirit of turpentine, or with the following liniment:—

No. 261. R. Linimenti Camphoræ Comp., Linimenti Terebinthinæ Comp., ʒʒ 3j.; Olei Cajuputi et Olei Limonis ʒʒ 3j. M. Fiat Linimentum vel Embrocatio.

These embrocations should be covered by a dry cloth, or by wash-leather, to prevent evaporation, and be kept applied to the affected part until they occasion redness and burning heat of the integuments. I have seen the pain removed also by the inner bark of the mezereon, previously moistened and softened, and kept applied to the part until a superficial sore was produced.—If pain or tenderness in the spine be also complained of, the means about to be noticed (§ 85, 86.), may be prescribed.

79. *c.* Hysterical pain in the regions of the stomach and spleen (§ 17.) often resists medicine, and disappears spontaneously, especially after marriage, or from changes in the states of the uterine system. It is sometimes relieved by camphor conjoined with hydrocyanic acid or with the acetate of morphia, or by the other antispasmodics and anodynes mentioned above (§ 78.). The warm epithem and embrocation, just recommended, has, however, proved most successful in my practice. Large doses of the subcarbonate of soda, with a carminative mixture or spirit, and tincture of henbane or of opium, often afford relief. An enema, containing either the spirit of turpentine and castor oil, or assafoetida and confection of rue, generally proves very serviceable.

80. *d.* When pain is severe in the region of the descending colon and left iliac region (§ 18.), or in other parts of the abdomen, with flatulent distension, increased sensibility, and other symptoms

resembling *peritonitis* (§ 21.), the above treatment is more to be depended upon than any other. The warm epithem or embrocation should never be omitted. The enema just prescribed will seldom fail of emptying the large bowels, and of expelling the flatus which is a chief cause of the more painful symptoms. When the complaint assumes the form of *hysterical colic*, the bowels being costive, these means are usually eminently successful. They may require, however, to be repeated. If palpitations be present in these cases, they depend upon, or are aggravated by, the flatus which often rises up into the oesophagus, and, by distending a portion of this canal, embarrasses the auricles of the heart. Hence the benefit which results from the means which are most efficacious in expelling the flatus, particularly from those just named; and from calomel, magnesia, prescribed with antispasmodics and carminatives, or warm purgative tinctures. — For pain in the region of the liver (§ 30.), the treatment here advised will be appropriate. In all these states of the complaint, the bowels should be kept moderately open by mild or stomachic purgatives.

81. *c.* When pain is seated behind, or just above the pubis (§ 20.), and particularly when it extends to the sacrum, to the os coccygis, or when it implicates the urinary bladder, or its functions, irritation, or vascular turgescence, or congestion of the uterus, may be inferred. Local depletions ought then to precede other means; and the mode, amount, or repetition, of depletion, should depend entirely on the habit of body of the patient, and the state of the catamenia. After those have been prescribed, the bowels must be evacuated by mild or stomachic purgatives, and the circulation equalised by cooling diaphoretics and anodynes. Camphor mixture, almond emulsion, solution of acetate of ammonia with nitrate of potash, spirits of nitric ether and tincture of henbane, are generally useful in these cases. But if the pain still continue, the external means above advised, and the enemata (§ 78, 79.), should be resorted to.

82. *f.* Pain in one or both mammae (§ 29.) is sympathetic of irritation or turgescence of the uterus or the ovaria; but it is sometimes associated with tenderness of one or two of the dorsal vertebrae. It is often removed by the treatment now prescribed. If there be scanty menstruation, leeches may be applied to the mamma; but the tops of the thighs, and hypogastrium, are preferable situations. I have found cooling diaphoretics with narcotics, as the solution of the acetate of ammonia, and camphor julep, with the acetate of morphia and an aromatic spirit, very serviceable in this state of disorder. In a case of this kind, where there were remarkable tenderness and hardness of the left mamma, evidently depending upon uterine irritation and turgescence, and for which I was consulted by another practitioner, complete recovery followed a short course of the solution of the iodide of potassium in camphor mixture; to which the solution of potash and henbane were added. If tenderness exist in any of the dorsal vertebrae, the treatment advised for this complication (§ 85.) should also be pursued.

83. *g.* In the more acutely painful or neuralgic affections connected with uterine disorder, the effect of a plaster with the extract of belladonna

and camphor may be tried. But when they are associated, as sometimes observed, with pain or tenderness in some portion of the spine, then the other local means about to be noticed may be also employed. I have seen the most marked benefit result, in these more acute cases, from half an ounce each of spirits of turpentine and castor oil, taken on the surface of milk, and repeated once or twice after the intervals of a day or two; or from a full dose of the former medicine, followed by the enema already mentioned (§ 79.), or by any suitable purgative. Repeated doses of turpentine, until either the kidneys are affected, or the bowels are entirely evacuated, and enemata containing a considerable quantity of this substance, will be found the most efficacious, when painful affections, connected with hysteria, are seated in, or extend to, the lower extremities.

84. *h.* Pain in the region of the kidneys, and in the course of the ureters (§ 22.), is evidently an extension of irritation from the uterus to these organs by direct sympathy, — a considerable portion of the nerves of the generative and urinary organs belonging to the same ganglia. The treatment should, therefore, be chiefly directed to the state of the uterine system. Local depletions will sometimes be requisite, especially if there are general or local plethora, and scanty menstruation. The fixed alkalies or the alkaline subcarbonates, with anodynes and the spirits of nitric ether or the compound spirits of juniper, will occasionally be of service, especially when the urine deposits a sediment of uric acid in the form of sand. When the urine is higher coloured, or deposits a pink or amorphous sediment, consisting chiefly of the lithate of ammonia, the infusion or decoction of cinchona with hydrochloric acid, or the balsams taken in the form of pills with magnesia, will be found beneficial. The digestive functions should receive due attention. A rubefacient, stimulating, or roborant plaster applied on the loins, as the aromatic, cummin, pitch, or ammoniacum plaster, will often also afford some relief.

85. *i.* Pain in the spine (§ 23.) is rather a complication, than a form, of hysteria; and is not to be viewed as altogether, or always, depending upon inflammatory action or irritation; but rather upon excited sensibility. There is no doubt that vascular excitement or congestion often exists in these cases, especially where there is much tenderness or prominence of one, two, or more of the spinal processes, or puffiness around them. In these cases, especially, there is more or less continued disorder of the uterine, or of the digestive, or of the respiratory functions, or even of all of these, according to the seat and extent of the spinal affection; and occasionally the cerebral circulation becomes also deranged. To this affection, DARWELL, TEALE, TATE, BROWN, and GRIFFIN have directed particular attention, under the name of *Spinal Irritation*, or, more properly, irritation of the spine, and have recommended for it local depletions and external irritants, &c. But whoever confides in these alone, or even principally, will find himself disappointed in many, if not in the majority of cases. They often, however, are important parts of the treatment, especially if plethora, general or local, or scanty menstruation, exists. In cases of this description,

the digestive functions should receive strict attention. the bowels being kept regularly open. In the majority, and particularly if there is debility or deficiency of blood, or too frequent or too copious menstruation, the sulphate of quinine, with camphor and extract of hop, or extract of hyoscyamus; the preparations of cinchona, with the alkaline subcarbonates, or with the mineral acids, according to circumstances; and the preparations of iron; will prove of great service, if appropriately administered. In some instances of the association of hysterical affection with tenderness of the spine, and with neuralgic pains in the corresponding nerves, I have found, after local depletions and alvine evacuations, pills containing full doses of the sulphate of quinine and sulphate of iron, with camphor and extract of hyoscyamus, very beneficial, and have added the purified extract of aloes to them with advantage, when the bowels were constive, or the catamenia deficient. Where the powers of the constitution are not impaired, or where there is excited action, an occasional recourse to the draught with spirits of turpentine and castor oil, or to the enema containing the same substances, will be of essential service.

86. *External means* of various kinds have been applied to the spine in these cases, often without benefit, sometimes with detriment, particularly when the increased sensibility depended upon sympathy with other parts, and upon great nervous debility. When there is sufficient evidence to infer that inflammatory irritation and turgescence have been excited in the membranes or investing structure of the spinal cord, then certain of these applications, as leeches, scarification and cupping, the tannin antimonial ointment, or issues, will be more or less beneficial; but in other circumstances they will be of no service. The relief which has followed the application of blisters, or of rubefacient and stimulating plasters, is no proof that the morbid sensibility of the spine depended in these instances upon inflammatory excitement or vascular turgescence; for, if these morbid states had existed in any degree of sthenic activity, these applications were more likely to have aggravated, than to have removed, them. Where they have actually given relief, there is reason to infer that the morbid condition was one of deficient vascular and nervous energy, rather than the reverse; and one for which general restoratives or tonics, as well as local excitants, were required. Much attention to the states of the various functions, particularly of those of the abdominal and pelvic viscera, and great discrimination, are necessary in these cases, to determine as to the local means appropriate to the various conditions of this class of affections. There are some applications which will not be injurious under any circumstance, but will be serviceable in many. The chief of these are the warm terebinthinate epithem and embrocation already noticed (§ 78.), applied over that part of the spine, chiefly, where pain is felt. Plasters, also, consisting chiefly of ammoniacum, compound pitch, or of red oxide of iron, &c., will subsequently prove useful. Where signs of inflammatory action of the ligamentous or other structures of the spine are present, the above liniment, epithem, or embrocation, applied to the affected part; and setons, issues, or open blisters, some distance below it, so as to produce a

derivation from the seat of morbid action; will frequently afford great relief.

87. *k. Pain in the sacrum and os coccygis* is generally not to be imputed to the same morbid states, as that referred to the spine. It frequently depends upon the condition of the uterus, particularly about the os and cervix uteri, and requires the same treatment as that advised for pain behind or above the pubis (§ 31.). Whether proceeding from this source, or from disorder near the origins of the nerves, or from disease of the structures of the spine, or of adjoining parts, the means just recommended, constitutional as well as local, will be useful when judiciously employed.

88. *l. Hysterical affections of the hip or other joints* (§ 26.) are very difficult to manage, and require, for their removal, not merely an improvement of the general health, but also strong impressions upon the mind and nervous system. The intentions of cure above stated (§ 76.), should be fully followed out, and the particular means already described fairly tried. The medicines which I have found the most successful are—the spirits of turpentine*, prescribed in various modes, internally and externally, and administered in enemata; the preparations of iodine, alone, or with narcotics; and camphor. These, however, should be associated with suitable adjuvants; amongst which, the several narcotics and antispasmodics are the most important. The warm or vapour bath, simple or variously medicated; mental excitement, and exercise taken regularly and energetically; and employment of the mind; are also important aids in the treatment. The affections of the joints are sometimes accompanied, or even alternated, with severe nervous pains in the extremities, and occasionally with tenderness in some portion of the spine. In such cases, the treatment hardly requires any material alteration. In those which have come under my care, I have very frequently prescribed the spirit of turpentine, as already stated (§ 83.), and often repeatedly in enemata; and, after two or three doses of it, I have commenced with the preparations of iodine, conjoined with henbane, opium, or belladonna. Whilst the iodine has been given, the turpentine has been administered in enemata, from time to time; and the embrocation or liniment above described (§ 78.), assiduously employed. In recent cases, particularly when the knee-joint was affected, this treatment has removed the disorder in a few days. In the case of a lady, whom I saw with Mr. Faxon, the complaint in this joint was almost instantly removed by the warm turpentine epithem applied around the knee. Various other medicines may be tried, and, indeed, require to be tried, before some of the foregoing will be submitted to by the patient. Most of the cases which I have seen, have been very obstinate, and have been treated by the more usual remedies, as the mineral sulphates, the preparations of iron, the sulphate of quinine, narcotics, &c., before I saw them. Sir B. BRODIE mentions favourably a

* The spirit of turpentine was first recommended by the author for these states of hysteria, and for neuralgic and similar affections. It has recently been advised for the same complaints by some French physicians. The originality of the practice may be known, by referring to *A Memoir on the Employment of Terebinthinous Remedies in Disease*, by JAMES COPLAND, M.D. &c., published in the *Lond. Med. and Physical Journal*, for July and August, 1821, p. 107—123.

long continued course of the sulphate of copper in small doses. The external application of the vegetable alkaloids, and of their salts, particularly *veratrina*, *aconitina*, &c., in ointments or liniments, has recently been recommended for cases of this description, and particularly for those attended by neuralgic pains, in much stronger terms than the real advantage derived from them warranted. I have prescribed these preparations in several instances of this kind, and have had the prescriptions prepared by the very best chemists, but permanent advantage was seldom derived from them.

89. Local hysterical pains will sometimes be relieved by friction with a stimulating liniment containing some narcotic (F. 497. et No. 261.) Sir B. BRODIE recommends a lotion consisting of equal parts of spirit of rosemary and camphor mixture to be applied tepid to the affected part. The simple exposure of the part to the vapour of hot water — the heat and vapour being confined by oil-skin, or by any other means — will often be useful. The vapour bath, employed thus locally, will be still more serviceable when the affected limb is cold, or is alternately hot and cold. It has been recently prescribed by Dr. J. WILSON in these and similar affections. (*Pract. Treat. on the Curative Effects of Simple and Med. Vapour applied locally*, &c. 8vo. Lond. 1837.) — Sir B. BRODIE states, that he has found the hysterical painful affections characterised by alternations of heat and cold, much relieved by the following plan: — “During the hot fit, let a compress be applied wet with a cold spirituous lotion; and when the heat has subsided, let a thick woollen stocking be drawn over it, and then an oiled silk covering over the stocking, so as to confine the heat and perspiration. When the cold fit has subsided, the oiled silk covering may be removed. This treatment, however, should be combined with the exhibition of the sulphate of quinine.” I have found the quinine more beneficial when given with camphor in these cases. The oxides or carbonates of iron may also be tried in electuaries; and conjoined with the confection of senna or of squibbony, when the bowels are costive.

90. B. When hysteria assumes anomalous spasmodic forms, or stimulates other spasmodic affections (§ 31.), the same principles of treatment as have been already explained should be adopted, according to the states of general or local vascular plethora, and of uterine function, and to the symptoms referable to the spine. There are few cases of this kind in which the spirits of turpentine, judiciously prescribed, or administered in enemata, will not prove of essential benefit; and some will require, in addition, the warm epithem, liniment, or embrocation, already described (§ 78.). But these are often resorted to only at considerable intervals. The tonics, antispasmodics, and anodynes, — the general plan of treatment recommended, — must be duly exhibited; and if evacuations be necessary, they should be resorted to as above directed. In most respects, these affections require nearly the same indications of cure, and the same means to fulfil these indications, as have been directed for the more painful complaints just passed under review, and particularly for those seated in the joints and extremities.

91. For hysterical cough or *usthma*, antispasmodics with anodynes or narcotics are very useful.

The preparations of valerian with ammonia or camphor, and henbane; a weak decoction of *so-nega* with emollients and hydrocyanic acid; small doses of ammoniacum, assafoetida, or of squills, with demulcents; the alkaline subcarbonates and extract of poppy, &c.; will severally be found of service. The treatment, however, must be modified, as previously advised, according to the states of the constitution and habit of body, of the catamenia, and of the temperature of the surface. The external means described above (§ 86.), will very materially assist the internal remedies; and sometimes the warm bath will be useful. — In hysterical hiccup, camphor and other antispasmodics, with anodynes, and the means just noticed, cold fluids, and cold enemata, will be found advantageous. (See also the Treatment advised for CONVULSIONS, and for CHOREA AND ITS RELATED AFFECTIONS.)

92. C. The comatose, cataleptic, or soporific states of hysteria (§ 33.) require but slight modifications of either the indications or means insisted upon above. During these states, the remedies advised for the paroxysm may be employed, appropriately to the local or general states of the circulation; and the most important of these are cold affusions or cold lotions on the head; and, in some instances, enemata of cold water, or containing the spirit of turpentine, or assafoetida, or camphor. Subsequently the treatment should be directed according to the state of the cerebral circulation. In most cases of this kind, the disorder of the uterus has excited, or otherwise deranged, the circulation in the brain; but generally in such a manner as to be relieved by the shower bath, or by frequently sponging the head with cold fluids. Due attention to the states of the bowels and of the catamenia, and the other means advised for CATAPLEPSY and CATAPLEPTIC ECSTASY (§ 18.), are necessary for cases of this kind. When hysteria assumes the form of *syncope* or *leptothymia*, sprinkling the face with cold water; the cold *douche*, or affusion on the head; volatile or empyreumatic vapours, held at some distance from the nostrils; bathing the face and neck with aromatic waters or spirits; pure air, &c.; are the chief means of restoration; after which the treatment must be conducted as above.

93. D. Paralytic affections and aphonia (§ 35.) hardly require any notice as respects the treatment, as the indications and means of cure already prescribed, are equally appropriate for them. After the bowels have been freely evacuated, and local irritations or congestions removed, a resolute exertion of volition, exercise in the open air, and mental and bodily employment, as far as they can be pursued, are especially beneficial in them, particularly when aided by a judicious administration of tonics or antispasmodics; by suitable diet and regimen (§ 100. et seq.); and by recourse to external remedies — particularly to frictions of the surface with stimulating and rubefacient liniments, to warm or medicated baths, &c. — When the paralytic state is manifested chiefly in the alimentary canal or urinary bladder, enemata containing the spirit of turpentine, or the warm terebinthinate epithem, or embrocation, applied over the abdomen, will be found almost immediately efficacious.

94. E. Hysterical disorders of the mental faculties consist not merely of the states already men-

tioned (§ 38.), but of others, of a less decided, but not less morbid, kind. Hysterical females are not merely capricious or whimsical; but they often become enthusiastic for a time, in the pursuit of an object, or in cherishing an emotion by which they have been excited. In many such cases, the nervous excitement and vascular turgescence of the uterine organs determine the character of the mental disorder; elevating certain of the moral sentiments, or of the intellectual manifestations, to a state of extravagance, passing, in some instances, into delusion or monomania. Many cases of puerperal mania are merely extremes of the hysterical disorder of the moral and intellectual powers; or states of the mind. All these more extreme forms of mental affection are observed only where, in connection with much local or uterine irritation, there is great deficiency of nervous energy generally, and of mental power in particular; or where, with such deficiency, there has been either much injudicious culture, or perversion, or improper excitement, of the imagination.

95. Females sometimes become passionately attached to an object; and this passion may advance even to nymphomania or monomania. The same person, on experiencing a disappointment in her affection, or if she be placed in circumstances entirely preventing the enjoyment of her passion, often becomes enthusiastically religious, especially if powerfully excited by popular preachers. After field preachings, or other ministrations of an exciting kind, the most hysterical females, especially those who have experienced the fully developed fits on these occasions, have become, at least for a time, the most religious. In this, however, there is little to regret: there is no harm, and generally much good, from this direction of the feelings; unless, indeed, advantage be taken of this excitement by certain Tartuffes, especially at love-feasts, &c.,—a circumstance by no means rare.

96. The hypochondriacal feelings, the desire to deceive, or to simulate various diseases, or the delusions, which sometimes possess the minds of hysterical females, may be classed with the foregoing, as requiring a similar plan of treatment. In all of them, the intentions of cure are—to remove irritation or vascular turgescence of the uterine organs; to improve the general health; to strengthen the nervous system; to calm the imagination; and to guide the moral impulses of the patient. The means by which the physical portion of these indications are to be fulfilled, have been sufficiently explained. The most efficient, however, of these means are not likely to be adopted by the patient, if she is entirely uncontrolled by friends. Few will resort daily to the shower bath, or even occasionally to terebinthinate enemata, or submit to a course of tonics, or to a suitable regimen, &c., whilst she believes her health but little affected. Even when the hysterical disorder is of a very painful kind, the variability or capricious state of her mind leads her to run from one physician to another, before opportunity of administering aid is afforded to any. At last, the most notorious charlatans, particularly those who either excite the body through the mind, or the mind through the body,—the animal magnetisers, the Homœopaths, the St. John Longs of rubbing celebrity, and the Campbells of celestial-bed notoriety,—fix her

attention. At such medical bagnios there is something promising gratification as well as excitement, and at such places hysterical as well as hypochondriacal patients “most do congregate.”

97. IV. OF THE PROPHYLACTIC TREATMENT OF HYSTERIA. — *a.* The avoidance of the occasional causes is the chief part of this treatment; and this is very difficult. The moral emotions and desires constitute the principal of these causes, and the prevention of them is not in the power of the physician; and, considering the general frailty of our nature, rarely in the power of the patient. — A physician, sufficiently acquainted with human nature, and with human life and society, will frequently discover the connection of the complaint with the feelings, and be able to give useful hints to the patient or her friends, as to the moral as well as to the medical management of the complaint. But his proper business is to correct the predisposing or constitutional cause, and to enable the patient to resist the exciting causes. An indolent, a luxurious, and an unoccupied life, leads to late hours in bed, to an excited state of the imagination, to susceptibility of the nervous system, to irritation and turgescence of the generative organs, and to general or local plethora. It cannot be sanguinely hoped, that females will relinquish ease, luxury, and enjoyment, from the dread of a distant and contingent ill. Most physicians of experience must have often observed the influence of these causes on the health, and have met with instances of females, who, when in ease and luxury, were subject to hysteria, having become entirely free from it, when reverses of fortune obliged them to employ both mind and body.

98. *b.* Much depends upon the moral and physical education of females about the period of puberty, in preventing hysteria. If more time were devoted to air and exercise, and less to mere accomplishments—if less strenuous efforts were made to cram much ill-assorted knowledge into the mind, in a very limited period—than usually is the case in the present day, an improved state of nervous energy, and of constitution generally, would result. There would consequently arise a race of females, possessed of stronger minds, and better able to make good wives and healthy mothers, than those too frequently met with in the easier ranks of life.—Of all the physical influences, by which the human constitution is permanently impressed in early age, there are none so powerful as *light, air, and exercise*. Females, while the frame is being developed, should strictly observe early hours, so that the period of repose should never be prolonged much after the dawn of morning. The propriety of sleeping in a large, well-ventilated room, cannot be disputed. It will be prudent, where more than one must sleep in the same apartment, to have separate beds, each no larger than is necessary for one person; and if the room is sufficiently large and airy, three, but no more, should sleep in it, preferably to two. When very early rising is enforced, the kind of bed, on which growing females should sleep, is not very important, although a hair mattress is perhaps the best; but the bed-clothing should be light, and the sitting, as well as the sleeping, apartments ought to be moderately cool and airy.

99. The kind of exercise which is most serviceable, is that taken in the open air and in the light

of day, and which brings into action the voluntary muscles generally, especially those of the lower extremities. It should preferably be on foot, and be regular, daily, and neither too little nor excessive. SYDENHAM, FULLER, MANDEVILLE, and MANNING advise riding on horseback, as affording the briskest motion, and occasioning the least fatigue. It ought always, however, to be used when the stomach is most empty; for, after a full meal, it retards digestion, rendering it uneasy and flatulent. It is most serviceable when hysteria is associated with retention of the menses, and a chlorotic state of the system, or when there is torpid action or obstruction of the digestive and abdominal viscera. In cases of this description, the advice given by MANDEVILLE will be found of great benefit. This is, to rise before six; to have half an hour's exercise in a swinging chair, flying horse, or the common swinging rope, and then breakfast; some time afterwards to get on horseback, for at least two hours, either galloping or trotting, as much as her strength will permit her; and, immediately after this, to be undressed, and assiduously chafed or dry-rubbed for a considerable time, till her skin looks red, and her flesh glows all over. MANNING observes, that frictions are useful, not only in the cure of the paroxysm, but also as a prophylactic. He directs them to be used on the extremities and trunk of the body, and especially on the abdomen when the digestive organs are weak. If hysteria be attended with the anomalous symptoms already noticed, or assume an irregular form, friction applied daily and assiduously along the spine, will be of great benefit. Sailing has been recommended by Dr. GUNTER, in the treatment of hysterical and other nervous complaints; and in certain circumstances it will be found useful.

100. *c. Cold bathing*, particularly salt-water bathing and the shower bath, will generally be serviceable at this period of life, if females have no particular dread of either, and if the surface of the body be afterwards well rubbed, and smart exercise immediately taken. For delicate constitutions, with a predilection to the disorder, it will be preferable to commence with a warm salt-water bath, or with a tepid shower bath, the temperature being gradually lowered to the usual grade. Sponging the surface of the body also, every morning, with salt and water, or with water containing some vinegar or a little of the nitro-muriatic acid, the temperature being at first tepid, but gradually reduced to the usual mean of cold, will generally prove most beneficial, not only in preventing the complaint, but also in removing it.

101. *d. Various mineral waters* frequently prove of great advantage in the preventive, as well as in the curative, treatment of hysteria. There is no doubt of the *Bath* waters being often beneficial in this complaint, although fashion has brought them into disuse, by bringing others into more general notice than they deserve. In females of a delicate constitution, with a languid state of the circulation, and want of tone of the nervous and muscular tissues, these waters, with proper management, will generally be most useful. In a similar state of system, the mineral waters of *Vichy*, *Barèges*, *Marienbad*, *Eger*, *Carlsbad*, *Pyrmount*, *Spa*, *Hart-fell*, and *Tunbridge*, will also be of great service, if employed appropriately to the pathological peculiarities of the case. The stronger chaly-

beates, however, should not be prescribed when the complaint is connected with general plethora, or where there is very marked vascular turgescence, or excited action of the generative organs. Where these waters are indicated, as well as in more doubtful cases, the springs of *Enns*, of *Bath*, and of *Seltzer*, will often be very beneficial. Seltzer water with warm milk may be used as the common beverage in most cases. As most of these waters may be procured in London and Brighton, there can seldom exist much difficulty in trying them, without leaving this country, or even the patient's home. The warm mineral waters can, however, be used only in *Brighton*, where they are prepared in a way not much inferior to their natural state. — In connection with the use of suitable mineral waters, *change of air* will be most beneficially prescribed. Indeed, much of the benefit attributed to the former actually proceeds from the latter; and in all cases where benefit is derived, both means are concerned in producing it.

102. *e. The diet* of hysterical females, as well as the medicines prescribed, should have strict reference to the states of the vascular system and of the uterine organs. In general, a milk diet, as advised by SYDENHAM, is very serviceable, particularly where debility is present; but much animal food is hurtful, especially where there is a tendency to plethora. A fish diet, and the use of shell-fish, are not less injurious, as favouring uterine turgescence, although much less productive of vascular fulness. A spare and cooling diet, consisting chiefly of farinaceous substances, is the most generally appropriate; but a somewhat liberal use of animal food is occasionally requisite. Slops, as weak tea, should be avoided. Boiled milk and bread should be preferred to either tea, chocolate, or coffee. The last is generally too heating, and ought not to be allowed, when the symptoms of uterine turgescence or irritation become very prominent.

103. *f. Patients* subject to hysteria should avoid warm apartments, and crowded rooms or assemblies. The extremes of temperature are most injurious to them. They should preserve their extremities warm, and be careful not to confine any part of the body, and particularly the waist, by too strait clothes or stays. — Mental and physical occupations are amongst the most beneficial means of treatment in this complaint; and advice respecting them should never be overlooked by the physician. The nature or kind of employment must entirely depend upon the circumstances and condition of the patient. The reading of exciting novels and of loose romances, and even music, are mere dissipation of time. The former ought not to be permitted by those who have the power of preventing it: and the latter should be subjected to a judicious control, and cultivated truly as an accomplishment, and as a relaxation from severer, and more rational, and more useful occupations.

104. As to advising marriage for young hysterical females, this, perhaps, may be as well left alone, although I do not altogether agree with MANDEVILLE, as to the risk of their children inheriting the complaint. He remarks, "in the first place, it may fail, and then there are two people made unhappy instead of one; secondly, it may but half cure the female, who may have half a

dozen children that shall inherit it. A physician has a public trust reposed in him: his prescriptions, by assisting some, ought never to prejudice other; besides, a young lady may not marry so well whilst she labours under this infirmity, as if she was in perfect health. Therefore, let her either be first cured, and then marry without being injurious to herself, her husband, or her posterity; or else remain single, with this comfort, at least, in her affliction,—that she is not liable to entail it upon others, who should be no less dear to her than herself." A principal reason for hysterical mothers having children that are hysterical and nervous, is, that they are generally bad nurses,—their milk being either deficient, or innutritious: when their infants are suckled by strong and healthy nurses, no such hereditary influence is usually observed. Nothing is of greater advantage in hysterical disorders, than mental tranquillity and cheerfulness. Fear, grief, and anxiety ought to be avoided, and the mind should be agreeably entertained and interested by useful employment.

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HYSTERIÆSIS. See **UTERUS**—*Inflammations of JAUNDICE.*—See **ICTERUS** (from *ictus*, the golden thrush, the sight of which was supposed by the ancients to cure the disease), *Pliny*, *Cælius Aurelianus*, *Morb. Regius*, *Celsus*, *Pliny*, *Morb. Arquetus*, *M. Arcutius*, *Columella*, *Celsus*, *Aurigo*, *Plautus*, *Varro*.

Cachexia Ictericæ, Hoffmann. *Icterus*, Boerhaave, Linnæus, Cullen, &c. *Cholelithia Icterus*, Young. *Ictericoides*, *Fellis Suffusio*, *Fellis Obstructio*, *Ictericus*, Auct. var. *Jaunisse*, *Ictère*, Fr. *Die Gelbsucht*, Germ. *Ictericia*, *Citrinæza*, Ital.

CLASSIF.—3. Class, Cachetic Diseases; 3. Order, Cutaneous Diseases (Cullen).

1. Class, Diseases of Digestive Function;

2. Order, Affecting the Viscera (Good).

IV. CLASS, 1. ORDER (Author, in Preface).

1. DEFIN.—Yellowness of the eyes and skin, sometimes passing to a yellowish-green hue, or even to a greenish brown; the urine being of a saffron or deep colour, the stools generally pale, and the course of the bile obstructed.

2. There are few diseases, the nature and morbid relations of which have occasioned greater diversity of opinions than jaundice. By some it has been viewed as a symptom of derangement, or of organic lesion, of the biliary apparatus, more immediately dependent upon obstructed discharge, and upon absorption, of bile. Others have considered it as independent of absorption of this secretion, and as the result of a morbid state of the capillary circulation. These, as well as other opinions, will be more fully noticed in the sequel; and I shall then show that it cannot be considered merely as a symptom of the morbid states of the biliary apparatus, to which it has commonly been attributed, although very often connected with, and sometimes originating in, these states. It occasionally appears in the course of bilious fevers, when there is no obstruction to the evacuation of bile. But the yellowness observed in the last stage of yellow and malignant fevers is not symptomatic jaundice, the change of colour depending, in these maladies, upon the morbid state of the blood, and upon the change in the capillary vessels and circulation, independently of biliary obstruction.

3. Jaundice is generally *sporadic*; but, according to MONRO, ALIBERT, and others, it has assumed, on rare occasions, an *epidemic character*, particularly at the terminations of campaigns, and after, particularly, very wet summers and autumns. It was thus said to have been epidemic in Cronstadt, in 1784 and 1785; and at Geneva, in 1814.—It is *endemic* in some places, particularly those in which, with a high range of temperature, the sources of malaria abound (see *ENDEMIC AND EPIDEMIC INFLUENCES*); but it is generally owing to the prevalence of biliary diseases and periodic fevers in these localities, that jaundice is also endemic.

4. I. SYMPTOMS.—A. *Precursory*.—Jaundice generally approaches with languor, depression of spirits, slight chills or rigors, anorexia; with uneasiness, tension, or weight at the præcordia; with flatulence, sour eructations, sometimes nausea or vomiting, or other disorders of the stomach; or with colicky pains, disturbed or irregular bowels, and headach. The stools are hard, ash-coloured, clayey, or whitish, indicating an absence of bile; and sometimes relaxed, although the evacuations are pale or whitish. In rarer cases, the biliary secretion is apparently more than usually profuse. The stools are commonly devoid of their usual odour, and are more or less offensive. There is an unpleasant taste in the mouth, with some thirst.

The tongue is loaded at its base. The skin is dry, and an itching or stinging is often felt on the surface. These symptoms are usually of short duration, and the affection manifests itself with much celerity.

5. B. The *yellow tinge* generally begins in the eyes, and extends to the temples, brows, and face; and thence to the neck, chest, and whole surface of the body. The colour is deepest in the wrinkles and folds of the skin, and in the lines of the face and hands. Sometimes it is distributed in deeper patches in one place than in another. It commences in the superior parts of the body, appears latest on the inferior extremities, and departs first from the parts where it commenced. The colour varies from a light yellow or lemon-colour, to a greenish brown; the intermediate shades of pale yellow, deep yellow, and yellowish green, being most common. With dryness of skin there is generally increased heat, particularly on the hands and feet. The itching and stinging are often also augmented, especially towards the night, and are most troublesome about the nostrils. In the more advanced stages, this symptom is diminished. The perspiration often then becomes free, particularly if the disease be attended by fever; and in some cases so abundant as to wet the linen, and to tinge it of a deep yellow. Sometimes a desquamation of the cuticle, or a psoriform eruption, follows these symptoms.

6. The bowels are frequently costive, and the faces clayey, pale, and scanty; but in some cases they are loose, and have a peculiar fetor. The urine is commonly high-coloured; yellowish and limpid at the commencement, afterward deep saffron-coloured or reddish, frothy, and thick. Sometimes it is nearly black, depositing a brick-coloured sediment; at other times a dark deposit. As the disease subsides, the urine resumes its clear and limpid appearance, unless dropsy supervene. The patient generally complains of a severe, heavy, or lancinating headach, with a sense of heat, particularly at the forehead; and he often falls into a state of deponency or melancholy, or becomes morose. There is sometimes lethargy, and frequently watchfulness. The tongue and palate are coated with a yellowish scord, and a bitter taste is felt in the mouth. The appetite is extremely irregular; sometimes being entirely lost, at other times ravenous. Thirst is usually present. Pain, weight, or a dragging sensation, and tenderness, are often felt at the epigastrium; frequently with flatulence, acrid eructations, nausea, difficult or painful digestion, and vomiting of a bitter, acrid, and sometimes dark, fluid. In some cases, acute pain runs in the course of the common duct, and increases as it reaches the epigastrium, with more or less uneasiness in the region of the liver, and top of the right shoulder, or beneath the right scapula, or between the shoulders. Violent pain is occasionally felt in the stomach, with short fits of colic. The respiration is readily accelerated, especially upon exertion; and there are sometimes paroxysms of cough. The pulse varies exceedingly. At the commencement, it is often hard and strong, but it is also frequently feeble, particularly as the disease advances. When severe paroxysms of pain are complained of, the pulse generally becomes frequent, hard, or full; but it is occasionally much slower than natural. Hæmorrhoids sometimes occur during

the disease; and they have often, after having discharged freely, proved a salutary crisis. Epistaxis has also been followed by a favourable result; but less frequently than the former evacuation.

7. Some *anomalous* appearances have been remarked during jaundice, which are deserving of notice, from the light they may throw on its pathology. The most important of these are — 1st. The suddenness of the attack — the almost instantaneous occurrence of it after violent affections of the mind. — 2d. Its restriction to particular parts of the body. BEHRENS, VALSALVA, ETTMILLER, and others, have observed it confined to the palsied side, in cases of hemiplegia. Dr. CHAPMAN has seen it limited to the face. A similar case has occurred to myself; and instances of its appearance only in the eyes are not uncommon. Allied to these states is the varying deepness of colour in different parts of the body. The deep greenish brown, verging to black, of the skin, commonly called green or black jaundice, described by Dr. Baillie, has been observed in one part of the body, whilst the usual yellow tinge has existed in others. LANZONI met with a case, wherein the throat and face were green, the right side of the body a greenish black, and the left yellow. — 3d. The yellow tinge, which objects occasionally exhibit to the patient during this disease, has been a matter of dispute; but it has been noticed, and believed in, by the majority of ancient authors; and was first disputed by MERCURIALLES, and afterwards by HALLER, HERBIDES, CHAPMAN, and a few others. I believe it to be of rare occurrence, but to undoubtedly occur, when the cornea, or humours of the eye, participate in the yellow tinge, with the other parts of the body.

8. C. DURATION. — Jaundice may disappear, or terminate fatally, in a short time; or it may continue for many months. When it proceeds from moral or mental causes, it is generally of much shorter duration, than when it depends upon visceral disease. In the latter case, it may endure even for years. — But instances sometimes occur of its rapidly fatal termination, when proceeding from acute visceral inflammation, particularly from inflammation of the substance of the liver, and when accompanied by depressed vital power, much fever, and a very frequent pulse. I have seen death occur as early as the fourth day in such circumstances. The darker forms generally proceed more rapidly, especially to an unfavourable issue, than the lighter shades of the complaint. But the duration of it entirely depends upon the constitutional powers of the patient, and the pathological conditions which occasion it.

9. D. TERMINATIONS. — Jaundice, like most other diseases, terminates in three ways. — 1st. In a return to health; — 2d. In some other malady; — and 3d. In death. — *a.* Restoration to the healthy state generally takes place without any apparent crisis, although a critical evacuation is sometimes observed. As soon as biliary obstruction is removed, the stools become darker; the urine paler, and the discoloration of the skin begins to disappear, the parts first changed being the first to regain their healthy hue. The *critical* evacuations, are *bilious diarrhoea*, very abundant perspirations, *hemorrhoids*, and *menorrhagia*. In

a case which I lately attended, the jaundice rapidly disappeared after the discharge of a blackish inspissated bile, which had evidently accumulated in the hepatic ducts and gall bladder for a long time. The quantity of this pitchy or tar-like matter which was evacuated, was surprising, furnishing a striking instance of the black bile or melaina of the ancients.

10. *b.* In other cases, the disease either acquires increased intensity, or assumes a modified character; — one of the varieties hereafter to be particularized occasionally changes into another. — In some instances, additional disorder is superadded, a *severe* or *dangerous complication* thus resulting; and in others, the jaundice disappears, but is replaced by another malady. Lethargy, coma, apoplexy, epilepsy, phrenitis, diarrhoea, cutaneous eruptions, inflammation and abscess of the liver, disease of the spleen or of the pancreas, dropsy, rheumatic attacks, &c., may thus supervene — the jaundice still persisting; — and ascites, anasarca, dysenteric attacks, abscess of the liver, and chronic enlargement of the spleen, may follow upon its disappearance. Jaundice is often, also, a symptom of inflammation and abscess of the liver; although these latter are sometimes consequences of the pathological state upon which this affection depends, particularly when they appear subsequently to it. But it is much more frequently a symptom merely; and is oftener consequent on, than antecedent to, or coexistent with, inflammation or abscess of this organ. Indeed, chronic inflammatory action, or active congestion of the substance of the liver, giving rise to jaundice, is more common, and antiphlogistic means are much more frequently required for the removal of it, than is supposed.

11. *c.* The termination in death may be preceded by the morbid states now enumerated, particularly when they assume their worst forms; — or it may be ushered in by increasing and urgent depression; by sinking of vital power; by great despondency; by ascites or oedema of the lower extremities, or both; or by hydrothorax; by great emaciation, hectic fever, and total loss of the digestive and assimilating functions, and by irritability of the stomach. In some cases, it has given rise to lethargy, coma, apoplexy, palsy, convulsions, or delirium, previously to a fatal issue. — It occasionally happens, as observed by Drs. CRYEKE and MARSH, that persons labouring under jaundice, whose nervous system has been previously injured, or greatly exhausted, are suddenly seized with cerebral symptoms, and die either phrenitic, or apoplectic, or in convulsions. But death by the sudden occurrence of coma, which becomes more and more profound, is the most common. Delirium also often precedes a fatal termination.

12. E. FORMS AND STATES. — Jaundice may be considered as *idiopathic*, when it supervenes suddenly upon violent affections of the mind. It is *symptomatic*, — its common form, — when it proceeds from diseases of the liver and biliary apparatus, or from obstruction of the common bile duct, or from lesions of adjoining parts, &c. To these some authors have added a third form, which they have termed *critical*. GRIMAUD states, that it has occurred as a crisis in some fevers; and BIANCHI makes a similar remark, — at the same time stating that when jaundice is critical, the

urine is almost or altogether natural; whilst in its symptomatic form it is generally of a deep yellow, and otherwise much changed.

13. Jaundice may present various degrees of severity. It may be accompanied with great febrile excitement, and thus assume an acute form, and quickly arrive at its termination. When this is the case, it is generally accompanied with active hepatic, or other visceral disease, and often passes into a very deep or greenish hue. I was recently called to a gentleman, aged about fifty, of a strumous diathesis, who had begun to ail the previous day. I found him slightly jaundiced, remarkably depressed in spirits, with a sensation of sinking at the epigastrium, the pulse being upwards of 120, and soft. The evacuations were at first clay-coloured and costive, but they soon became copious, black, and tar-like. Delirium appeared on the following day: spontaneous hemorrhage from the bowels occurred, followed by coma, relaxation of the sphincters, and death on the fourth day. The jaundice progressively increased, and, on the third day, the surface had become a greenish brown. The friends would not allow the body to be inspected.

14. Jaundice may also proceed in an extremely mild form, or with but little constitutional disturbance,—the appetite, pulse, and mental powers being scarcely affected; and in this form it may continue long, or soon disappear, sometimes after very inefficient means of cure, or even without the use of any medicine. The liability of the disease to recur from slight causes—as errors of diet, intemperance, &c.—has sometimes given it an apparently periodical character, which, although contended for by some authors, is entirely accidental, or, at least, the consequence of a concurrence of several of its causes, at certain seasons or periods, especially in situations abounding in the sources of endemic maladies.

15. II. CAUSES.—i. The Predisposing Causes are indolence, dissipation, intemperance, and sedentary occupations, particularly those performed in a stooping posture, and with pressure on the hypochondria and epigastrium. Jaundice is not infrequent among the studious; and especially amongst those who are harassed by cares, disappointments, and the depressing passions, and whose nervous energies are exhausted. It seems also more frequent in hypochondriacal and hysterical persons, and those who neglect, or are deprived of, their usual active engagements. It is common to all ages and sexes. HENRIEUX found, that out of 100 successive patients with this disease, 52 were males. It is frequently met with in cooks, and bakers, and in workmen exposed to high ranges of temperature, or addicted to intoxicating liquors. In females, it is oftener observed during pregnancy, and after the cessation of the catamenia, than at other epochs.

16. ii. The most common Exciting Causes are the more violent mental emotions, as the sudden communication of distressing intelligence, fright, terror, rage, anger, grief, anxiety, despondency, losses and disappointments, jealousy, petulance, peevishness, and irritability of temper. I have known it to follow the communication of joyful intelligence. Particular kinds of ingesta, especially such as disagree with the digestive organs, as stale, unseasonable, and unwholesome fish; drinking cold fluids when the body is perspiring;

cold applied to the feet and surface of the body after exertion, or during free perspiration; and the bites of animals, particularly those which are venomous; also occasionally produce jaundice, especially in those who have experienced a former attack. According to HOFFMAN, venereal excesses, and intemperance in the use of intoxicating liquors, are amongst the chief causes of the disease. Great debility and exhaustion of the nervous energies, and, as clearly demonstrated by Dr. CHRYNE and Dr. MARSH, mercurial courses, particularly when employed in hospitals and close apartments, sometimes occasion it. I believe, however, that mercurials are a cause, only when they are given to produce their specific effects, or, when the exhibition of purgatives has been neglected, when required. The prevalence of the disease during revolutions, invasions, sieges, and campaigns, has been remarked by many writers; and its occurrence after intemperance in eating or drinking must be familiar to all. The excessive use of coffee; austere, and acid, or unripe fruits; and, indeed, any error of diet, or deleterious substance received into the stomach; will sometimes produce it. The suppression of accustomed discharges and eruptions, and the retrocession of rheumatism and gout, also not infrequently occasion it.

17. When the pathological conditions of the biliary and digestive organs exist, with which this disease is most frequently connected, many causes, that under different circumstances would produce but little effect upon the system, will readily excite it. Severe pain, mental affections, an irritating purgative, or particular kinds of food, will sometimes be sufficient to give rise to an attack, especially when pre-existing disorders of the biliary organs is associated with great nervous exhaustion. Jaundice is not infrequently caused by obstructed circulation through the heart; and by a torpid state of the cæcum and colon, with accumulations of feces and scybala in their cells. It often follows agues and other periodic fevers; and it then usually depends upon some one of the morbid states of the liver, already noticed. It often occurs in the course of bilious remittent fevers, and occasionally without any apparent diminution of the biliary discharge, and even with evidence of augmented secretion of bile. It is also often associated with dysentery, or with other diseases, as will be shown in the sequel.

18. III. The MORBID APPEARANCES most frequently found in persons who have died with jaundice, are the following:—a. The surface of the body generally preserves the same colour after death, as previously to dissolution. PORTAL and myself, however, have seen the intensity of colour diminished; and, in other instances, the skin of some subjects, who had never had jaundice, assume, after death, a deep yellow. The limbs are often flexible, and oedema of the extremities is not infrequent. The body is commonly emaciated. The serum in the oedematous limbs, as well as that in the internal cavities, is either of yellowish tint, or of a dark hue. The various structures are more or less tinged of the same hue, particularly the cellular, adipose, and serous tissues. The internal surface of the blood-vessels, and even the cartilages, tendons, periosteum, and bones, are sometimes also changed in colour. The muscles are often tinged, and softer and more flaccid than natural. MORAGNI had re-

marked, that the substance of the lungs, heart, liver, kidneys, and spleen is often softened, and contains a yellowish, a greenish yellow, or reddish fluid; and subsequent observers have also noticed these appearances. Most of the *secrections* partake of the same tinge; and the serum of the blood is also similarly altered. The fluid effused into the ventricles of the brain and all the membranes, are thus changed; but the substance of the brain itself, and the humours of the eye, are generally of their natural colour.

19. *b.* The *liver* and its appendages, most frequently of all the viscera, present morbid changes. The liver itself has been found with all the lesions consequent upon every form of inflammation. It is sometimes greatly enlarged, its blood-vessels congested, its ducts engorged, and its structure softened, inflamed, deeply tinged, or suffused with bile, and containing one or more abscesses, or their remains, &c. At other times it is extremely pale, apparently devoid of blood and of biliary secretion, atrophied, hardened, scirrhus, and tuberculated. In one case it is changed to a white, parboiled state; in another converted into a fatty, steatomatous, tallowy, or adipocercous substance. Occasionally its ducts are loaded with green inspissated bile, obstructed by concretions of cholesterine or of resinous matter. In other instances they are entirely empty, or contain merely a little thin, pale fluid. Sometimes the surfaces of the liver adhere to the adjoining viscera, and collections of matter or large abscesses press upon them, or upon the bile ducts, or open into the latter, or into other parts. In a few instances the *hepatic veins* have been found more or less obstructed, or pressed upon by tumours or enlargements of adjoining parts. In one instance of jaundice connected with abscess of the liver, I detected inflammation of these veins, several of them being plugged up with lymph, or filled with pus. In rarer instances, hydatids are found in the liver, or attached to it. (See art. LIVER.)

20. *c.* The *gall bladder* often contains *calculi*, the number and size of which are very various. When one only is found, it is usually very large. The gall bladder may be distended with *bile*: in this case the fluid is much changed; being generally of a deep green colour, or greenish black, thick and ropy, and sometimes containing granular matter. In some instances, the accumulated fluid is of a pale orange colour, and thin consistency. A portion of fluid of this description, which was taken from a subject dead of tuberculated liver, jaundice, and dropsy, was examined by Dr. BOSTOCK, and found to consist of water, albumen, and a little colouring matter, without any of the usual biliary principles. STOLL found the gall bladder filled with a whitish serum. In other cases it is entirely or nearly empty. Sometimes marks of inflammation are observed in its coats. The last named author found them changed to a semicartilaginous state. FRANK, LOUIS, and ANDRAL met with ulceration of the internal surface, with softening of the coats of the gall bladder; and a similar case occurred to myself, where it contained gall-stones. ANDRAL found it softened and ruptured. Excrescences into its cavity have been noticed by BONET. Adhesions of it to the adjoining parts are occasionally observed. Its entire absence in this disease occurred to M. BOURGOISE; but

this is merely a coincidence. In a case of absence of gall bladder in a patient at the Infirmary for Children, there was no jaundice; and similar facts have been observed by others.

21. *d.* The *biliary ducts* are frequently obstructed, in some cases by gall-stones, in others by the pressure of tumours in the pancreas, mesentery, pylorus, or duodenum. The common duct is not infrequently obstructed by scirrhus or other tumours in these situations. In this case, as well as when it contains calculi, the gall bladder, and the duct above the seat of obstruction, are generally greatly dilated, and filled with thick, dark-coloured bile. This dilatation sometimes extends more or less throughout the ramifications of the hepatic ducts. In a case which occurred in my practice some years ago, and where both the common and the pancreatic ducts were completely obliterated by their inclusion in a large, hard, or scirrhus tumour, developed between the root of the mesentery, and head of the pancreas, — this latter being remarkably enlarged, — the gall bladder contained about twelve ounces of this kind of bile, and the ramifications of the ducts through the liver were much dilated. The coats of the ducts sometimes exhibit marks of inflammation, — are ulcerated, thickened and indurated, and the calibre of their canals are much reduced. In some instances, the ducts are entirely obliterated, and reduced to a thin fibro-cellular cord. This obliteration I have seen confined in one case to the common duct, in another to the cystic duct. In the latter instance, the gall bladder was enormously distended with a deep green viscid bile: the obliteration of the duct must have been subsequent to the accumulation of the secretion in this reservoir. STOLL, PORTAL, ANDRAL, and others observed a cartilaginous state of both the common and cystic ducts. LIEBERAUN, LUDWIG, and CHURMAN found lumbrici in the common duct, in icteric patients.

22. *e.* The *stomach* is not infrequently seriously altered, particularly when the disease has been occasioned by intemperance, especially in the use of spirits. The pylorus in those cases is sometimes thickened, cartilaginous and greatly constricted (STOLL). — The *duodenum* is often, also, the seat of lesion, especially in the vicinity of the ducts. It is sometimes inflamed, thickened, softened, or indurated, ulcerated, and, in rare cases, apparently scirrhus. Tumors of various kinds have involved its coats, at the place where the ducts enter it, either entirely obliterating their apertures, or very greatly diminishing them. OZENB found this viscus remarkably dilated, so as to press upon the ducts. The *pancreas* is occasionally enlarged, scirrhus, or otherwise altered, — pressing upon, or obstructing, the ducts. Great enlargement of the *right kidney* has also produced this effect. The *spleen* is sometimes enlarged, or otherwise altered.

23. *f.* Alterations of the *vena porta* are also met with in jaundice. M. HONORÉ found this vessel nearly impervious. It has been observed considerably enlarged throughout its ramifications, and congested with black blood. In a great number of icteric cases, the viscera adjoining the gall bladder are much stained by the exudation of bile through its coats. But this is an entirely *post mortem* appearance. — *Dropsical effusions* into the

various cavities are frequently met with, and occasionally coincident lesions in the *heart, lungs*, as well as in some one or more of the abdominal viscera.

24. It should not be overlooked, that each, or several, of the foregoing lesions have often been present without jaundice,—a circumstance which has led some pathologists to deny the origin of it in the presence of bile in the circulation; and that jaundice has existed in patients, in whom no organic lesion was detected after death,—an occurrence which has led physicians, since the times of HOFMANN and MORCAgni, to impute the disease, in some cases, to spasm of the biliary ducts, and induced others to view it as an occasional consequence of the accumulation in the blood of the materials of which bile is formed, owing to inaction of the liver. But there is every reason to suppose that undetected disease of the heart had existed in many of these, and had obstructed the return of blood from the liver.

25. In cases of jaundice, particularly in those of long standing, a yellow or greenish yellow tint, in different degrees, is usually observed in every texture and organ of the body, and in all the fluids and secretions, whether natural or morbid. The fat is usually of the deepest colour. The humours of the eye and the cornea are seldom or ever tinged. A case is, however, related in HORN'S *Archivus (Für Pract. Medicin. b. vi. p. 341.)*, where they exhibited this change of colour. The yellow hue has rarely been detected either in the cerebral structure, or in the medullary tissue of the nerves; although instances have occurred to BARRUOLIN, MORCAgni, and PORTAL, of its appearance in the former.

26. IV. OF THE PATHOLOGICAL RELATIONS OF JAUNDICE.—Jaundice is more or less intimately connected with one or other of the following pathological conditions:—1. With an exuberant secretion of bile;—2. With inflammation and abscess of the liver;—3. With congestion of the liver and portal system;—4. With chronic alterations of the structure of the liver;—5. With spasm, or temporary obstruction of the gall ducts;—6. With the passage or existence of gall-stones;—7. With inflammation, obliteration, or compression of the biliary ducts, or gall bladder;—8. With inflammation of the duodenum.

27. i. *Jaundice with Exuberance of Bile.*—This variety was first contended for by M. PORTAL, and afterwards by M. M. CONNAC, ALIBERT, VILLENEUVE, and others. It has been referred to an excited state of the vital actions of the liver, particularly to the predominance of its secreting function. It is sometimes met with in temperate climates, during summer and autumn, especially those which approach nearest the tropics; but it occurs chiefly in warm or intertropical countries, and in those who live indolently and luxuriously or intemperately, or who are of a bilious temperament. It is generally preceded by supraorbital headach, bitter taste in the mouth, loss of appetite, nausea, bilious vomiting, followed by a yellowish, or greenish yellow tint of the skin. The chief characteristic of this form of the disease is the absence of constipation, and the presence of bile in the evacuations, which are either natural, or more frequent than usual. I have seen it accompanied with slight bilious diarrhoea, with febrile action, or with a full or strong pulse. It

may be presumed, that a portion of the bile is absorbed in this variety, during its course through the biliary passages, or through the intestinal canal, owing either to increased activity of the absorbing vessels, to the state of the bile itself, or to partial obstructions in its course through either of these parts. It is often complicated with dysentery, hepatitis, and bilious fevers, particularly in miasmatic and intertropical countries.

28. ii. *With Inflammation and Abscess of the Liver*—*Hepatic Jaundice*, SAUVAGES and CULLEN—*Ictericum Pyrexia*, ALIBERT.—Jaundice may accompany any form of inflammation in this organ, particularly when the internal structure is the seat of the morbid action. Although inflammations of the liver are so extremely frequent in India, yet jaundice is a comparatively rarer attendant on them there, than in this country. In Continental countries, this association of jaundice is very common. The rare occurrence of jaundice, as a symptom of hepatitis, in India, is perhaps owing to the liberal use of calomel in the treatment of hepatic affections. But it is when abscess forms in the liver, that we most frequently find jaundice supervene on hepatitis. In a very large proportion of the cases of abscess of this viscus, detailed by M. ANDRAL (*Clinique Médicale*, t. iv.), jaundice appeared;—and a similar frequency of connection has occurred in my own practice. Out of six cases of abscess of the liver to which I was called, in 1826 and 1827, in consultation, four had jaundice during some period of their progress, subsequently to the occurrence of the symptoms indicating the formation of matter.

29. In almost every case of jaundice from inflammation or abscess of the liver, the nature of the disease is very readily recognised. The symptoms of hepatitis are well marked, particularly the pain, uneasiness, and tumefaction in the right hypochondrium and epigastrium; the scanty, dark, or brownish urine; the dry cough; the pain in the right shoulder, clavicle, and side of the neck, or under the right scapula, &c.; and the full and frequent pulse, &c. (See LAFAYE—*Inflammation of, and Abscess of.*)

30. iii. *Jaundice from Congestion of the Liver*—*Interperies calida*, of SENNIERT—*Icterus a Plethora*, of F. HOFMANN.—The connection of this state with jaundice has been admitted by SAUVAGES, GRIMAUD, BANG, PORTAL, CORNAC, and MANOURY. It is generally observed in persons of the bilious and sanguine temperaments, who live luxuriously or intemperately, and either pursue sedentary occupation, or are deprived of requisite exercise. It is chiefly to this and the preceding pathological states, that we are to refer the instances of jaundice, which take place from the suppression of the menses, or of accustomed discharges, particularly the hæmorrhoidal, and from the retrocession of gout and rheumatism. Active congestion of the portal vessels is connected with more or less plethora, and congestion, of all the vessels that convey blood into the vena portæ. The blood circulates with difficulty through the liver; and the bile, which is formed, generally in great abundance, owing to the highly venous state of the blood, often is retarded and accumulated in the ducts, during its course to the gall bladder or duodenum. Owing to this retardation or obstruction, a portion of it is absorbed, probably by the radicles of the hepatic veins, as they pass out of

the granular structure, where the biliary secretion is performed, and the ducts take their origin. It is obvious, that obstructions of the return of blood from the liver, owing to organic lesion of the heart, will also give rise to this form of the complaint, and that such occurrences are not rare.

31. iv. *With Chronic Organic Alterations of the Liver* — *Aurigo ab Obstructione, SAUVAGES* — *Ictericus Apyreticus, ALBERT*. — In this form of the disease, the accession of the jaundice is generally very slow; the colour is livid or dusky, permanent, and often extremely deep, approaching sometimes a greenish or olive hue, forming the green or black jaundice of several authors. The organic alterations vary remarkably; consist of those already enumerated (§ 18. *et seq.*); and are often complicated with lesions of the adjoining viscera, or with dropsical effusions. In the majority of these cases, the bile seems either to be secreted with morbid properties, and to be conveyed into the circulation almost as soon as it is secreted; or, what appears still more probable from the morbid appearances very frequently detected, the materials of which bile is formed, are not combined by the liver, and converted into bile, but, having experienced the preparatory change, merely pass onwards from the granular structure of the liver into the radicles of the hepatic veins, and, circulating with the blood, tinge the textures of the body, particularly the rete mucosum. That there is sometimes no due secretion of bile, is shown by the secreting structure of the liver being often found either completely destroyed, or so altered, as not to admit of the demonstration of its peculiar texture; and also by the pale, straw-coloured, tasteless, and albuminous serum found in the ducts (§ 19.); or by their empty, atrophied, and pale states. This variety of jaundice is generally the consequence of intemperance, or of residence in miasmatic districts, or in warm climates. It is often observed in persons of middle age, or somewhat further advanced in life; and is preceded by chronic dyspeptic or bowel complaints; and by indications of disorder in the liver, often of many years' duration.

32. v. *Jaundice from suspended Function of the Liver, or from Spasm of the Ducts* — *Icterus a Spasmo, HOFMANN*. — That jaundice ever proceeds from spasm of the gall ducts, has been denied by several writers. CULLEN, POWELL, ANDRAL, and JOURDAN have, however, contended, that spasm of the ducts sometimes occurs, and produces the disease, especially in cases arising from mental emotions, and the irritation of the upper portion of the intestinal canal. Sudden mental affections, — as fright, terror, rage, anger, disappointment, excessive joy, — frequently occasion a most painful and oppressive sensation at the epigastrium, faintness or difficulty of respiration, and paleness of the countenance. This state is occasionally followed almost instantly, but always in a very short time, by yellowness of the face and surface of the body. In some cases, the functions of the brain are much disturbed, and a febrile state of the system takes place. In others, nausea, vomiting, &c., in addition to the icteric affection, are produced. In these, the moral affection influences the state of the nerves proceeding from the solar plexus; and hence the morbid sensations referred to the epigastrium. The slow depressing passions of the mind were also supposed, particularly by

VILLENEUVE and MANOIRY, to occasion spasm of the ducts; and physical pain was considered by M. PORTAL occasionally to operate in a similar manner. When jaundice is connected with hysteria, epilepsy, or hystericalgia, HOFFMANN referred it to the same cause. Even the bites of venomous reptiles were supposed by MEAD and BOSQUILLON to produce icterus in a similar way. BARTHOLIN, LANZONI, and VAN SWIETEN have imputed the rare occurrence of jaundice from the bites of dogs, or other animals, also to this circumstance.

33. Cases of this kind admit of a different explanation from that proposed by the above writers. It is more probable that violent mental emotions, and that sedative poisons taken into the stomach, or inserted into the tissues, suspend the organic nervous influence, and thereby arrest the functions of the liver, than that they occasion spasm of the ducts and adjoining parts. That this latter state, however, may occur, I will not deny, especially when nausea, retching, or vomiting are added to the icteric affection, or when the duodenum is irritated in the vicinity of the ducts. The more or less complete paralysis of the biliary organs, produced, for a time, by the causes alluded to above, favours the absorption or passage of bile into the circulation, and the accumulation in the blood of the elements of which bile is formed.

34. The principal characteristics of this variety of jaundice are its rapid appearance and short duration. It is seldom deep, and generally is of a pale yellow, or bright yellow hue. It often disappears without the aid of medicine; and the treatment resorted to, in such cases, thus obtains a reputation it does not deserve.

35. vi. *With Inflammation and Obliteration of the Ducts and Gall Bladder*. — The ducts may be inflamed, and obstructed in consequence of the turbulence accompanying the inflammation, or as M.M. JOURDAN and PRESCHKE have stated, of some degree of spasm attendant on it. The inflammatory action may also extend to the gall bladder, or be almost entirely limited to it. Inflammation and its consequences have been observed after death in one or other of these situations, both in connection with, and independent of, jaundice; and have most probably been induced by the irritating properties of the bile passing through the ducts, or by the extension of inflammatory action from the internal surface of the duodenum to that of the common duct. In either circumstance, the ducts above the obstruction may become dilated, although not to the extent observed after obstructions of a more permanent kind. If, however, the consequences of inflammation furnish a permanent obstruction, this result will often occur.

36. In cases of this kind, the patient has more or less fever, dry skin, thirst, and anorexia or nausea, or even retchings. Pain is felt in the right hypochondrium, particularly under the exterior and inferior angle of the right shoulder blade, extending to the epigastrium, on the right side of which, or beneath the extremities of the right false ribs, a pyriform moveable tumor is sometimes felt. The stools are without bile. More or less fulness of the right hypochondrium and epigastrium is also often present, sometimes with pain not only in the above situations, but also in the back, and in distant parts. These

symptoms may continue an indefinite period with various degrees of severity; and may subside with the jaundice after a time, upon the resolution of the inflammation.

37. In less favourable cases, owing to the thickening consequent upon the inflammation, or to the exhalation of coagulable lymph from the internal surface of the inflamed duct, together, perhaps, with spasm, its canal becomes permanently obstructed, and the vessel is ultimately reduced to a fibro-cellular cord. In these, the jaundice generally continues, and all the digestive and assimilating functions languish; death ultimately taking place.

38. vii. *Jaundice from Compression of the Ducts by Tumors, &c.* — The lesions of the adjoining viscera already referred to (§ 21.), particularly the formation of scirrhus and other tumors in the pancreas, pylorus, mesentery, &c. involving and obliterating the ducts; enlargement, and disease of lymphatic glands in the vicinity of the common duct; engorgement or inflammation of the pancreas, occasioning compression of this duct; great enlargement of the right kidney; distension of, or accumulations of hardened faeces in, the caecum and colon; the gravid uterus, &c.; may occasionally interrupt the passage of bile into the duodenum, by pressing upon the ducts, and thus occasion jaundice. It is only by pressing scybalæ, or hardened faeces lodged in the cells of the colon, upon the duodenum and common duct, that the gravid uterus causes jaundice. It is extremely difficult to ascertain the presence of any of those causes during the life of the patient; although suspicions of the existence of some of them may be entertained from the *tout ensemble* of the symptoms, and the effects of remedies. When jaundice arises from accumulated faeces, the effects of purgatives will often demonstrate its origin. The frequency of this cause has been justly insisted on by VAN SWIETEN and others.

39. viii. *Jaundice from Calculi in the Ducts* — *Aurigo Calculosa*, SAVARUS. — Calculi lodged in the ramifications of the hepatic duct, may occasion, or rather be connected with, jaundice; but their presence in the common and cystic ducts is a more frequent cause. They are more rarely found in the hepatic duct, but they may produce the disease in that situation. Their impaction in the cystic duct, even when the gall-bladder is filled with dark bile, does not uniformly occasion this affection, as shown by numerous observers. When they obstruct the common duct for some time, this effect very generally, although not always, follows; and the symptoms, particularly when the calculus approaches to, or is passing through, the coats of the duodenum, are often very well marked. In many cases, however, calculi pass without giving rise to jaundice, or, indeed, to any very prominent symptom or ailment; and in others, they pass with violent sufferings, and yet no jaundice is occasioned.

40. More commonly the occurrence of jaundice from the impaction of calculi in the bile ducts, particularly the common duct, is attended with pain, weight, pressure, and uneasiness towards the epigastrium, especially when the patient lies on the left side. Acute, colicky, and spasmodic pains are felt at intervals in the region of the duodenum, under the right shoulder blade, and extending to the hypochondrium and epigastrium, followed sometimes with nausea, vomiting,

and a sense of heat at the stomach. Occasionally, a tumor is detected between the epigastrium, hypochondrium, and umbilicus. When the fits of pain are violent, the patient often complains of vertigo, of the extension of the spasm to the abdominal muscles, and even to the extremities. There is seldom only one calculus, generally several; and the attack is often renewed upon the passage of each, with a varying degree of severity according to their size. The jaundice in these cases may precede, or even follow, the painful symptoms. Upon the discharge of the calculi, these symptoms quickly subside; but the jaundice disappears only slowly, or even persists or some time.

41. The production of jaundice by the presence of worms in the ducts has been stated by several authors, and doubted by others. Dr. CHAPMAN refers to a preparation demonstrating the fact in the museum of the University of Pennsylvania.

42. ix. *Jaundice from Inflammation or Congestion, &c. of the Internal Surface of the Duodenum.* — Various deleterious ingesta, acrid salts and poisons, emetics, and purgatives, articles of food which offend the stomach, drinking cold fluids, &c. when the body is overheated, or exposure to cold, have been supposed by BROUSSAIS and his followers sometimes to occasion so much inflammation and turgidity of the mucous membrane of the duodenum and adjoining parts, particularly about the orifice of the ducts, as to entirely to occlude it, and thereby to give rise to jaundice. That this takes place in rare cases, or that congestion in this situation will have the same effect, may be admitted, although satisfactory proofs of the circumstance cannot be readily furnished. The inflamed and turgid state of the duodenum may be limited to it, or may even extend to the ducts, as stated above, and thus cause obstruction (§ 35.). The jaundice accompanying bilious fevers and dysentery may depend upon this pathological state.

43. It is probable that this variety of jaundice will be attended by very nearly the same symptoms, as characterise that proceeding from inflammation of the ducts; but that, unless the ducts become implicated, the jaundice will be less marked, and of shorter duration, than when they are inflamed. The presence of nausea, vomiting, or of diarrhoea, or of sympathetic phenomena, in such cases, furnishes but slight evidence of this pathological state. ORCHY states that he has seen the duodenum dilated so as to press upon and obstruct the ducts, in a case of jaundice; but there was probably some other lesion upon which the jaundice more immediately depended than upon this.

44. Various other morbid states of the duodenum may occasion jaundice, particularly the accumulation of mucus on its surface, or about the orifice of the ducts; and various organic lesions seated in this part, or extending to it, or to the ducts from adjoining viscera. The former of these is probably not an infrequent cause of the slighter and less enduring kinds of jaundice, particularly in infants (§ 43.), children, and young persons.

45. V. JAUNDICE FROM SUSPENSION OR ARREST OF THE SECRETING FUNCTION OF THE LIVER — *Pseudo Jaundice.* — In this form of dis-

ease, which cannot be considered as a variety of true jaundice, bile is not secreted or formed from its elements in the blood, owing either to a paralysed or suspended state of the vital action of the liver, or to disorganisation of it to an extent entirely subversive of its functions. In either case, the elements, from which the bile is formed, accumulate in the circulation, change the colour of the serum and of the blood generally, and thus render the skin lurid or murky. In a further advanced stage of the disorder, certain of the principles, or even the colouring matter, of bile are fixed, or deposited, in the tissues, imparting to them either a darker, or a more jaundiced hue.

(See art. DISEASE, § 108.) The slighter states of this form of disorder frequently accompany torpor of the liver, as observed in this country; and the more marked states of it often occur in miasmatic and warm climates. In various fevers also, and in some epidemics and pestilences, the action of the liver is entirely suspended; the surface becoming dark or lurid. This takes place to a remarkable extent in *pestilential cholera*, and is heightened by other circumstances.—When this state of disease arises from disorganisation of the liver, its accession is slow, and the discoloration of the surface often proceeds through a dirty or lurid hue to the greenish or greenish black colour about to be noticed. In either of the pathological states producing the discoloration, there is an entire absence of bile from the stools; and the secretions from the kidneys and skin are dark, or otherwise altered, from the presence of the elements or of the principles of bile.—When the vital power of the organ is suspended, there is seldom pain or other prominent symptom detected in the region of the liver. There is even sometimes an unusual absence of symptoms indicative of acute hepatic disease, excepting the complete suspension of the functions of the organ. But when the structure of the viscus is so altered, as to be incapable of discharging its offices, the antecedent disorder, as well as the attendant phenomena, will generally indicate the pathological relations of the affection, aided by the history of the case, and a knowledge of the causes. The alterations of the liver, already noticed in connection with true jaundice (§ 19.), will occasionally, when carried to the highest pitch, give rise to this form of the disease, or to the next to be noticed (§ 46.).

46. VI. OF GREEN OR BLACK JAUNDICE.—*Μελαία νόσος*, GREC.—*Ictericit nigra*, FORBES—*Icterus viridis*, *Melas icterus*, *Melanchorus*, FENNEL, et Var. Auct.—*Icterus Melæra*, GOOD—*Green Jaundice*, BAILLIE—*Black Jaundice*.—This is merely the extreme grade of the disease. It was first described by ANCRAS; but although somewhat circumstantially noticed by several authors, the first satisfactory account of it was furnished by Dr. MARCAND and Dr. BAILLIE. The colour of the skin varies in depth from a yellowish green, to a deep green or olive colour. The temperature of the surface is not increased; but burning heat is felt in the palms of the hands, and soles of the feet. The evacuations are often pale; but sometimes they are dark coloured, pitchy, with grumous coffee or chocolate like matter, and slight diarrhoea. The urine is occasionally clear, but oftener very dark and loaded,

tinging the linen of a dark, tawny hue. The patient is greatly depressed, physically and morally, and complains of anxiety at the epigastrium, and of tenderness either in that situation, or in one or both hypochondria. A sensible enlargement of the liver is often felt, and sometimes also of the spleen. In a case which I lately treated, both these viscera were very remarkably enlarged. But an opposite state as frequently obtains. The pulse is usually natural or slow. Vertigo, sickness, and vomiting of a green, acid colluvies, occasionally are present. In the intervals, the appetite is either capricious, or but little affected.

47. This form of jaundice seldom attacks young persons. It is commonly met with in the aged or advanced in life, and is much more frequent in males than females, particularly in those who have lived long in unhealthy intertropical countries, or who, with great anxiety and fatigue, have been tried by frequent changes of climate. It is generally connected with the most chronic and profound organic lesions of the liver, especially those which involve, or destroy, its secreting structure, and obliterate the minutest ramifications of the ducts through the organ. It seldom admits of more than a partial removal, but terminates in either a fatal exhaustion, or with coma, apoplexy, epilepsy, or palsy. Abdominal dropsy frequently takes place in its progress. Its course, in its slighter grades, is generally slow,—sometimes continuing, with various fluctuations, for seven or eight years; but when the colour becomes very deep, it often terminates rapidly, in either of the above ways.

48. When green jaundice is attended with pitchy, or dark, grumous evacuations, there is generally either a congestion of the spleen, and of the portal system of vessels, with the secretion of a dark-green unhealthy bile, a portion of which is absorbed, and deposited in the structures, particularly in the *rete mucosum*; or a congested and hæmorrhagic state of the mucous membrane of the stomach, duodenum, and upper part of the intestines, owing to the obstructed circulation through the liver; but both pathological conditions may be present, giving rise to an exhalation of venous blood from this membrane, and thereby to the dark and grumous motions. The mucous membrane in these situations is usually found, on dissection, dark-coloured, mottled, softened, ecchymosed, or its venous capillaries loaded. The other viscera, particularly the liver and ducts, present the appearances already described (§ 19, 20.).

49. VII. COMPLICATED JAUNDICE.—By this appellation, I mean the occurrence of jaundice—1. during the course of some other disease; and, 2. upon the subsidence or suppression of a pre-existing disorder, which may not only be concerned in its appearance, but also in its removal or recurrence.—A. The maladies during the progress of which jaundice most commonly occurs, are chiefly those fevers which implicate, in a more or less marked manner, the liver and digestive mucous surface. Thus it is frequently observed in the course of gastric, and of bilious remittent fevers, of both an inflammatory or low character. It is also not infrequent in connection with *ague*; and, owing partly to this circumstance, it has been said by some authors to recur periodically. Its appearance in the course of *typhus fevers* is

comparatively rare. MENDE has sometimes remarked it; and CHENEY notices its infrequency. When it occurs during fevers, it may be imputed either to diminished excreting activity of the liver, and the rapidity of absorption of a portion of the secretion, or to obstruction in the way of the opening of the ducts into the duodenum, from a tumefied, congested, or inflamed state of its mucous surface. In some cases, both states may contribute; whilst in others, the secretion takes place more rapidly than it is conveyed into the bowel, although its flow is in no respects impeded. The secretory function of the organ may also be much diminished, — the constituents of bile being left in the blood.

50. We occasionally also observe jaundice in connection with organic lesions of the heart, *hysteria*, *dropsy*, *melancholia*, *delirium tremens*, *apoplexy*, *palsy*, and *epilepsy*. — When it is complicated with *hysteria*, the urine is usually very abundant and limpid, and the complication is of a much less serious nature, than with the other maladies just named, which more frequently terminate unfavourably, when thus associated. — When it occurs in consequence of interrupted circulation through the heart, dropsy, or hæmorrhage, often also supervenes. We also not infrequently hear of it in connection with certain *cachectic* and *malignant affections* of a chronic character. Several of the states, which are usually attributed to jaundice, in the last stages of these maladies, are not true jaundice, and do not proceed from the presence of bile, or of its constituents, in the circulation; but from the absorption, and admixture with the blood, of a portion of the morbid matters formed in the seat of the local or malignant affection, or of some of the morbid secretions retained in the digestive canal (§ 54.).

51. B. Jaundice sometimes follows the subsidence or suppression of other diseases, and is even removed by the reproduction of certain of them: it often appears after periodic fevers, and occasionally upon the sudden arrest of these fevers by large doses of cinchona or of sulphate of quinine, especially when these are exhibited before morbid secretion, or accumulations have been evacuated. In such cases, the jaundice depends chiefly upon superinduced congestion or inflammation of the internal structure of the liver. The stoppage, also, of hæmorrhoids, sometimes gives rise to jaundice, by inducing these morbid conditions of this organ; the re-establishment of the hæmorrhoidal flux generally removing the congestion, and favouring resolution of the inflammatory action. A similar result occasionally occurs from obstruction of the catamenia, and from suppression of dysentery, diarrhoea, of gout, and of rheumatism, especially when morbid secretions, and collections in the digestive canal, have not been removed. The relation of gout to several of the pathological states which give rise to jaundice, and the conversion, in some instances, of the one into the other, have been remarked by several experienced physicians; and a similar connection has been noticed between this latter and the other diseases just named.

52. VIII. TRAUMATIC JAUNDICE. — Jaundice sometimes occurs after concussion of the brain, and severe injuries of the head. The influence which the brain exercises on the functions of the liver, has been often the subject of remark than of explana-

tion. It has usually been imputed to sympathy; or, in other words, the morbid relation has been stated, and our ignorance of its nature admitted at the same time. Severe injuries, when they suspend the energies of the brain, may also lower the secreting and excreting functions of the biliary apparatus, by diminishing its nervous energy, and placing it in a state which (§ 33.) favours the absorption of bile into the circulation, independently of any very obvious change in the structure of the liver or ducts. There is, however, every reason to suppose that jaundice subsequent to severe injuries, particularly of the head, sometimes results from phlebitis, originating in the seat of injury, or from the passage of purulent or other morbid secretions thence into the circulation. In either case, purulent collections will sometimes form in the liver, and give rise to jaundice by pressing upon the hepatic ducts and veins. Severe injuries in other situations than the head, — as compound fractures, &c., — will sometimes also produce the same results. That purulent collections form in this viscous, under these circumstances, almost as frequently as in the lungs, is a fact fully established by the observation of the author, and other pathologists; and although jaundice is not a constant, yet it is a very general, attendant upon them. — Injuries, wounds, &c., which implicate any part of the biliary apparatus, occasionally produce jaundice, by the immediate change they induce in the functions or structure of it; and it is not unlikely that, in some of the instances where the injury seemed to have been inflicted on the head, the liver actually had sustained the chief injury, or had experienced a concussion, of which jaundice was the consequence, either with, or without, inflammatory action diffused through the substance of the organ. — When jaundice follows blows or injuries on the region or vicinity of the liver, and especially if it be attended by a dull or aching pain, inflammation extending through the substance of the organ may be inferred to exist.

53. IX. INFANTILE JAUNDICE. — *Icterus Infantum* — *Icterus Neonatorum* — *Yellow Gum*. — Jaundice is usually slight during the infantile age. It is generally attended with languor, drowsiness, or debility; and may be referred to the following pathological states: — 1st. To the stagnant and altered blood contained in the umbilical vein, changing the state or colour of the serum; — 2d. To a partial absorption, from retention of the meconium; — 3d. To saburræ accumulated in, and absorbed partially from, the duodenum and small intestines; — 4th. To obstruction of the aperture of the ducts from viscid meconium, and mucous sordes; — 5th. To spasm of the excretory biliary ducts (BEAUMES); — 6th. To a superabundance of the biliary secretion: — and, 7th. To obstruction, or a paralysed state of the secreting structure of the liver. The first, second, and third of the above sources may so change, or deepen the colour of, the serum of the blood, independently of any absorption of bile, as to give rise to the yellow state of the cutaneous surface frequently met with in infants. — Superabundance of the biliary secretion may exist in more than one respect; — this fluid may be secreted in unusually large quantity, or it may have accumulated in the ducts and gall bladder during the period immediately antecedent to birth, or it may have flowed into the duodenum in very large quantity, and

mixed with the secretions of the digestive mucous surface, forming a meconium, abounding more than usual in biliary principles, instead of the bland albuminous fluid, which is usually formed for the purpose of assisting foetal nutrition and growth.—A paralysed state of the secreting structure of the viscus has been ascribed by M. BEAUMES to injury sustained by the brain during child-birth, but it may exist independently of this cause. One or more of the above pathological states may give rise to jaundice in infants, which is generally mild, and readily removed by medicine. It usually occurs very soon, or within the first week, after birth, particularly when the bowels have been neglected; but it may appear at any period. When it comes on within the first week after birth, it seldom continues above four or five days, and is usually slight.

54. X. OF CACHECTIC OR SPURIOUS JAUNDICE.

—Morbid secretions readily pass into the circulation in the course of various malignant, pestilential, and cachectic maladies, and impart a dark or dirty hue to the serum, and otherwise affect the blood, producing a similar tinge in most of the tissues,—the cutaneous surface closely approaching the colour of jaundice, but differing from it, in being more lurid and dusky, and in the absence of biliary obstruction. In low states of vital power, morbid secretions may be absorbed from the digestive canal, and thus affect the circulating fluids; and in a similar state of vital power, secretions or morbid matters in other situations, as from the uterus in the puerperal state, from abscesses, from disorganisation of the cellular tissue, &c., may pass into the circulation, and impart a lurid or jaundice-like tinge to the external surface and other parts. The contamination of the fluids and soft solids in the latter stages of chronic malignant maladies, as carcinoma, fungoid disease, is also attended by a change of the cutaneous surface resembling jaundice, but essentially differing from it. For the hue of the skin in these maladies proceeds from the admixture of morbid matters absorbed from the seat of local mischief, vitiation, and tinging the serum of the blood of a deeper hue, and thereby rendering darker the *rete mucosum*; and not from the presence of bile, or even of its chief constituents, in the circulation (§ 63. b.). The lemon, yellowish, or even the yellowish green hue of jaundice, is very different from the lurid, dirty, or murky appearance of the surface consequent on these maladies. In these, the pale or clayey state of the stools, and the saffron tinge communicated by the cutaneous and urinary secretions in jaundice, are wanting, whilst the alvine evacuations are usually dark, morbid, and very offensive.

55. The appearance of the cutaneous surface in *chlorosis* resembles a slight attack of jaundice; and it is necessary not to mistake the one for the other. This will be avoided by attending to the age, the functions of the uterus, and to the evacuations. In *chlorosis*, the discharges are more natural than in jaundice, the perspiration and urine not communicating to the linen the saffron tinge observed in the latter complaint. In *chlorosis*, also, and, indeed, in the latter stages of chronic malignant diseases, the waxy state of the integuments, and the smallness of the vessels, indicate a deficiency in the quantity, as well as in the quality, of the blood.

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56. Instances, however, may occur, in which the morbid colour of the surface is increased in the course of cachectic and malignant maladies, by the absorption of bile into the circulation, or by the accumulation in it of the elements or principles of which bile is formed, owing to torpor of the liver. Indeed, this latter cause of heightened discolouration of the surface, in the course of these maladies, is by no means rare; for the liver largely partakes of the depressed state of vital power characterising them. When malignant disease occurs either in the substance of the liver, or in parts near the capsule of Glisson, it is generally associated with jaundice, which gradually deepens from a lemon hue to a dark or dusky green colour, the urine assuming a greenish brown tint, and the patient sinking from exhaustion and coma. This association has been well illustrated by the recent researches of Dr. BRIGHT, which have appeared since this article was written.

57. XI. OF THE DISTINCTIONS MADE BY AUTHORS.—Jaundice has been variously distinguished—into *Idiopathic* and *Symptomatic*; *continued* and *recurrent* or *periodical*; *febrile* and *non-febrile*; and into *Yellow* and *Black Jaundice*—*Icterus* and *Melanicterus*. It has been further distinguished into *Inflammatory*, *Plethoric*, and *Nervous*; into *sporadic*, *endemic*, and *epidemic*; into the *mild* or *benign*, and the *malignant* or *pernicious*.—Jaundice is generally *sporadic*; but it is *endemic* in some localities, particularly in those which are low, humid, and warm; and which abound in terrestrial exhalations, as in some situations in the South of Europe, and among Europeans residing in various parts within the tropics, particularly in the Eastern hemisphere. It has likewise been so prevalent at some periods, especially in autumn and early in winter, even in temperate countries, as to have been considered *epidemic*.

58. The *malignant* or *pernicious* form of jaundice, noticed by writers, sometimes occurs in warm climates, and in marshy districts in the South of Europe, particularly during autumn, when low remittent or bilious fevers are prevalent. It entirely depends upon a general or diffused inflammation, or inflammatory congestion, of the liver, or both of the liver and spleen, with retention of the biliary and other secretions, great depression of vital power, deep or dark green discolouration of the skin, very quick pulse and febrile disturbance, terminating rapidly, sometimes with intestinal hæmorrhage, and always with delirium and profound coma. This form of jaundice is not, however, confined to the climates and localities just specified; as I have been called, within a short time, to two cases in London, which presented all the characters of the most *pernicious* state of the disease, and which terminated fatally in four or five days.

59. *Idiopathic* or *primary jaundice* has been denied, first, by BORRHAAVE and STOLL, and subsequently by PINEL, LOUYER VILLERMAU, GUYMAUD, and others; whilst it has been contended for by numerous writers. The truth is, that the difference between *idiopathic* and *symptomatic*, particularly as relates to jaundice, is often merely verbal, and is in a great measure relative. In a very strict sense of these terms, jaundice is never a primary complaint; whilst it may frequently be viewed as such, if we consider it, with many other maladies, as constituting the principal, and one of

the earliest morbid conditions, which can be recognised by our senses. According to this more obvious mode of distinction, the occasional occurrence of idiopathic jaundice, as after mental emotions, cannot be disputed. The variety usually attributed to spasm of the ducts, but which I have considered as depending rather upon a change in the state of organic nervous influence and functions of the liver than upon spasm, may, conformably with this view, be considered idiopathic.

60. The classifications and distinctions of jaundice by no-ologists and authors require no further notice. Indeed, they do not deserve the space they would occupy, especially as SAUVAGES adduces forty-six species, arranged, according to the various causes, pathological states, and associations, which the complaint presents. Even VILLENUEVE has divided it into thirteen species, several of which are subdivided into many varieties, which do not admit of any distinction in practice.

61. XII. PROGNOSIS.—The prognosis necessarily varies with the age, sex, temperament, and habit of the patient, and the pathological relation and complication of the disease.—A. It is generally more favourable in young, than in old, subjects; and in those, in whom the energies of the frame are sufficient to bring about a return to the healthy functions, than in persons of a broken-down constitution, and with disorganised viscera. If it occurs in females from plethora, occasioned by the suppression of the menses, previous to the climacteric period, if the health has not been previously much affected,—if the abdominal viscera betray no marked disease,—if the respiratory function is unembarrassed, the heart's action regular and natural, and the vital energies not materially depressed; if the colour does not progressively deepen; if it proceed from the sudden, and violent emotions of the mind, as anger, fright, &c., or from bodily pain; if it arise from articles of diet or of medicine, which have disagreed with the digestive organs; if it depend upon plethora of the portal system, without inflammation or process, or on the passage of calculi along the ducts, in persons not far advanced in age, nor greatly debilitated; if a repelled eruption or suppressed discharge return; if the alvine evacuations are not much changed from their natural colour, or when the biliary secretion reappears; if the discolouration originate in temporary obstruction or pressure on the ducts, as in pregnancy, distension of the duodenum or colon; if the epigastrium and hypochondria are not constantly painful, or tender upon pressure; and if the disease seems to proceed from the more temporary causes of obstruction in the duodenum, or from spasm; the prognosis may in general be favourable;—yet I have seen jaundice exist in these circumstances, and where there seemed no reason to infer an unfavourable issue, and coma has suddenly appeared, and quickly carried off the patient.

62. 51. An unfavourable prognosis, on the other hand, or, if not strictly unfavourable, a very guarded opinion, should be given, when this affection occurs after the cessation of the menstrual periods, or in aged females, or when it is caused by debauchery and intemperate indulgences, particularly in spirituous liquors. If symptoms of

organic lesion of the viscera attend it; if the epigastrium and hypochondria be tumid, tender, and constantly painful, with heat of the palms of the hands and soles of the feet; if the respiratory function be impeded, or the circulation through the heart be irregular or obstructed; if the energies of life be depressed; if chronic disease have preceded the discolouration of the surface; if the colour deepen, be of long standing, and particularly if it be of a dark green hue; if it take place from the continued operation of the same cause, as grief, anxiety, and the depressing emotions; if the urine be small in quantity, white, or albuminous, or very dark, turbid, thick or blackish; if there be indications of supervening dropsy; if a colliquative form of diarrhoea supervene, or very dark, grumous, or pitchy evacuations, or vomitings of a nearly similar matter; if the affection be of long duration, and particularly if it be associated with dropsical effusions; if hiccup, with tumefaction of the epigastrium and hypochondrium, or a tympanitic state of the abdomen, be present; if delirium, delirium tremens, mania, epilepsy, lethargy, coma, paralysis, convulsions, or apoplexy occur; if intestinal hæmorrhage, or hæmatemesis, take place; if the jaundice proceed from calculi in aged persons, or appear after repeated attacks of ague or remittent fevers, and from continued melancholia; if it be accompanied with great depression of the mental and physical powers; if marked cachexia, and great emaciation, be present, and especially if it be complicated with internal or external malignant disease, a very unfavourable prognosis should be given.

63. XIII. REMOTE AND PROXIMATE CAUSES.—The chief causes have been stated in what has been advanced respecting the pathological relations of jaundice.—a. It is obvious, that the more remote causes are those which induce the alterations, of which the discolouration is a symptom. These are fully detailed above (§ 15.), and in the articles CONCRETIONS — BILIARY; DUODENUM; GALL BLADDER AND DUCTS; and LIVER—Diseases of. Those, which most frequently induce this complaint, are — habitual excitement of the liver, duodenum, and digestive organs generally, by too rich, too stimulating, or too much food, or by spirituous or intoxicating beverages; sudden and violent mental emotions; anxiety, or the depressing passions; high ranges of temperature, indolence, and full living; vicissitudes of temperature; the ingestion of cold fluids when the body is perspiring; miasma or exhalations from the soil, especially in connection with humidity of the air; suppressed discharges and accustomed evacuations; interrupted circulation through the heart, occasioning congestion in the vena cava and hepatic vein; previous disease, particularly periodic fevers, &c.; whatever depresses the energies of life, and at the same time favours internal visceral obstruction; and the organic changes already noticed.—b. The proximate cause of jaundice may be stated to be the passage of the colouring or other principles of bile into the circulation, and the consequent discolouration of the skin and other tissues, heightened in some of the varieties by the accumulation in the blood of the elements of which bile is formed.

64. XIV. TREATMENT.—There are few diseases, which require so much discrimination, as to the indications and means of cure, as jaundice. It

proceeds in different cases, as shown above, from so many different pathological states, and sometimes from so many combinations of them, that the utmost attention and practical acumen are necessary to ascertain the morbid conditions and peculiarities of the case, and to determine what is most efficacious in removing them. It is requisite not merely to guard against vascular excitement on the one hand, and vital depression on the other; but in many cases, also, to prevent or to remove both, as being the more immediate causes of the obstructed secretion or excretion of bile. In all cases, the states of general and local organic nervous power, as well as of general and local vascular fullness or action, must claim particular attention; and, in many, it will be found requisite to aid the former, whilst we diminish the latter. In any circumstances, it is very difficult to ascertain what are the effects of remedies upon the circulation and functions of the liver; for much of what has hitherto been said and written upon the subject, has been characterized by dogmatism, rather than by truth,—by vague assertion, unsupported by evidence. Some of the medicines, which have been supposed to excite the liver, probably operate by removing slight obstructions from the mouth of the common duct, by reducing vascular turgescence in the duodenum, and carrying off mucous collections; and others, which have been viewed as inert, as respects this organ, have as great influence upon its functions, as those whose effects have been considered specific. The operation of medicines in affections of the liver so much depends on the state of vital activity and of vascular action, on the extent to which biliary collections may have formed, and on the facilities to its excretion, that facts are rarely observed with that degree of precision in all these relations, which should entitle them to confidence, or to be made data for practical inferences.

65. i. *Jaundice from an exuberant Secretion of Bile*, there being no evidence of its obstruction, is not so frequent in this, as in miasmatic and warm climates. In these especially, the treatment must have due reference to the remote causes, and to the more immediate source of the biliary exuberance. In temperate climates, and in European constitutions, this state of the biliary function is connected with biliary remittent fever, and is most appropriately treated by the means most serviceable for the constitutional affection; but it sometimes continues, or returns, after the fever has disappeared. In these cases, as well as in those where it presents a more idiopathic character, there is every reason to infer the presence of active circulation in, or vascular determination to, the liver, probably with increased activity of the absorbent function. For them, moderate local depletion from the margins of the ribs, or from below the shoulder blades; *roving diaphoretics*, especially the nitrate of potash, the solution of acetate of ammonia, or subcarbonate of soda, and spirits of nitric æther in camphor mixture; *emollients and demulcents*; soothing enemata and *diluents*; are the most efficacious means, particularly when the causes no longer exist, or when the patient is removed from the influence of miasmatic exhalations, or enjoys a dry and pure air.—The diet in these cases should be very spare, and consist of mucilaginous and farinaceous

substances; animal food should be taken sparingly and cautiously during convalescence, and stimulating beverages entirely relinquished.

66. ii. *Jaundice from Inflammation of the Substance of the Liver* is more frequent than is generally supposed. It is often merely an exalted state of the former variety; the vascular disorder having advanced to such a pitch, as to obstruct the secretion or excretion of the bile, owing to the general turgescence of the vessels, and consequent pressure on the minuter bile ducts; and it is most frequently observed, when the internal structure of the organ is generally inflamed, or is the seat of one or of several abscesses. (See *LIVER* *Inflammation of*.) When the attack is slight, and is attended by little pain, or by pain increasing slowly after pressure; and when there is little fever, the pulse being oppressed, rather than much accelerated; local depletions from the margins of the ribs, and from the anus, with the other means just advised (§ 65.), will generally remove all disorder. But when the bowels are costive, additional means will be required, especially *scourals* with antimony; *saline medicines*, alone, or with other *aperients*; a solution of sulphate of magnesia in camphor julep, with the solution of the acetate of ammonia, and spirits of nitric æther; the warm turpentine epithem applied over the epigastrium; the warm bath, &c.

67. In the more acute cases, particularly when there are much fever, intensely deep jaundice, very quick pulse, dry tongue, flushed countenance, and scanty, dark urine, the treatment should be most actively antiphlogistic.—General bloodletting ought to be early employed, and be followed by local depletion; by full doses of *calomel*, or of calomel with James's powder, camphor and opium; by *saline aperients*; by *antimonials* and *saline diaphoretics*; and by the rest of the means advised in the article on *Inflammation and Abscess* of this organ. In all such cases, the treatment should vary according to the history of the case, particularly in respect of previous disease of this viscus, and to the habits, age, and other circumstances of the patient. If the treatment be not active at the commencement, and in some instances where it has been both active and judicious, delirium and coma will supervene in four or five days, or even earlier, if vital power be exhausted, and if the discolouration be very deep. In this stage, treatment will seldom be of much avail. The propriety of then having recourse to depletion will entirely depend on the strength and frequency of the pulse, on the state of the hepatic regions, and on the means previously employed. In some, local depletions may still be resorted to; but, in all such, camphor with other mild restoratives will be appropriate. Calomel will seldom be of any use at this period, if it have been already liberally prescribed. If it have not been employed, it may be given with camphor. Some benefit may accrue from an occasional exhibition of a draught containing spirit of turpentine with, or without, castor oil; from the same substances administered in enemata, from the warm turpentine epithem applied over the epigastrium and hypochondria, and from a large blister on the nape. When jaundice is dependent upon abscess of the liver, the

treatment must be conducted as advised for this state of disease, in the article LIVER.

68. iii. *Jaundice from Congestion of the Portal and Hepatic Veins* often requires very nearly the same treatment, as just recommended for the slighter states of the preceding variety (§ 66.). — *Local bloodletting* is generally sufficient; and, unless in cases where the congestion depends upon dilatation of the cavities of the heart, the application of leeches to the anus is preferable to cupping over the hypochondria. If the congestion is connected with a stoppage of the hæmorrhoidal flux, leeches are especially serviceable. When congestion is chiefly in the hepatic veins, the circulation through the heart and lungs is often interrupted, and the congestion soon extends to the portal system, to the mesenteric veins, and the digestive mucous surface; the early stage of jaundice being characterised by a bloated appearance of the face, sometimes with lividity of the lips, and a deficiency, merely, of the bile in the stools. In these cases, the treatment should be chiefly directed to the primary complaint, and be modified according to the evidence furnished of the cause of obstruction. (See *Hæmorrhoids, Organic Lesions of*.) — When hæmorrhage in the digestive or respiratory mucous surface occurs in this variety, as sometimes observed, cupping from the sternum, or leeches applied to the anus, will be of service. In many cases of this kind, the liver is more or less enlarged, owing to the prolonged congestion; and, although there can be but little expectation of a permanent restoration of this organ to its functions, whilst the obstruction to the circulation continues, deobstruent and saline purgatives will generally be useful, especially mercurials, the bitartrate of potash with the sub-borate of soda and confection of senna, the preparations of taraxacum with soda, and the hot turpentine epithem placed on the abdomen, &c. — *Dropsical effusion* sometimes takes place in the advanced course of this form of jaundice, and requires diuretics, in addition to the decided exhibition of the medicines just named. The internal and external use of the spirits of turpentine; the compound decoction of *Scilla*, with the acetate of potash, or with carbonate of soda, and spirits of nitric æther; weak solutions of the hydriodate of potash, or the solution of potash; occasionally the more drastic or hydrogogue purgatives; and a course of deobstruent mineral waters, such as those of the Beulah Spa, of Cheltenham, Pullna, Seidschutz, &c.; will sometimes be of service.

69. iv. *Jaundice from Chronic Organic Lesions of the Liver* requires a treatment modified according to the history of the case, and the signs furnished by a careful examination of the hypochondria, and even of the lower regions of the thorax. If the patient have had attacks of acute or subacute hepatitis or dysentery, or is subject to chronic dysentery or diarrhoea, very probably the circulation through the extreme branches of the portal vein, and the passage of bile along the small ducts, are obstructed by a deposit of albuminous lymph from the inflamed vessels in the areolæ or reticulations of the connecting cellular tissue of the organ, and by the pressure on these vessels thereby occasioned. In cases of this kind, more or less enlargement of the liver may be detected, especially in those which are less chronic;

although, in the more protracted, the liver may have regained its former size, or have become even smaller, its structure being dense, granulated, or otherwise changed. In these latter, the nutrition of the organ, as well as its functions, is impaired; and the deposits formed in the substance of the organ become organised, or partially identified with it, and perpetuate the obstruction. In this variety, particularly in the less prolonged instances of it, the exciting causes of the hepatic disorder should be avoided. — *Diet and regimen* will very much assist the treatment. Stimulating food and drink should be relinquished, and deobstruents and alteratives adopted. If any remains of inflammatory action still exist, leeches should be applied to the anus, or to the epigastrium. In any circumstances, *Plummer's pill* should be taken regularly at bedtime, either alone, or with a little soap and extract of taraxacum (F. 503. 511.), and the bitartrate of potash, with the sub-borate of soda, in any vehicle, or with other medicines, according to the state of the bowels (F. 89. 96. 98.).

70. If elevations of blood from the bowels occur, the *hydrargyrum cum creta* with *iperacanthia*, enemata containing spirit of turpentine, or an occasional draught with this substance and castor oil, or the nitric or nitro-muriatic acids in the simple infusion of roses, will be useful. In all cases, frequent frictions over the hypochondria and epigastrium with an oleaginous and deobstruent liniment (F. 297. 311.), or with this conjoined with the mercurial liniment, will be of essential benefit. This variety, like the preceding, is very apt to become complicated with *anasarca* or *ascites*, or with both. In this case, the decided use of mercurials, the more drastic and hydrogogue purgatives, the bitartrate of potash in large doses with borax, diuretics, and the other means noticed above, and advised for Dropsy, proceeding from disease of the liver, will be requisite. Assiduous frictions of the hypochondria and abdomen with liniments, particularly with these just mentioned, or with those containing the iodide of potassium, and a course of deobstruent and purgative mineral waters (§ 68.), will sometimes be of use.

71. v. *The more doubtful Source of Jaundice in Spasm of the Ducts* requires means which have a stricter reference to the remote causes, and to the symptoms peculiar to the case, than to the existence of spasm. A large proportion of the cases usually attributed to this state, most probably would have been found, upon a more accurate investigation, to belong either to congestion of the hepatic veins; or to calculi lodged in the ducts; or to obstruction of the mouth of the common duct, arising from the states of the duodenum; and they consequently would have required a similar treatment to these. The affection attributed to the ducts may have been almost entirely confined to the duodenum; the means found of service, as *calomel* alone, or with opium, saline or other purgatives, anodynes, emetics, &c., instead of acting upon the former, actually removing the disorder of the latter, or carrying off mucous sordes from its surface, or subduing vascular turgescence from around the opening of the common duct. — When there is any reason to suppose that the reputed spasm of the ducts is actually a paralysed state of the organic nervous influence of the liver and ducts, restorative means will then be required. The

chlorate of potash with carbonate of soda, gum ammoniacum with Castile soap, the nitric or nitro-muriatic acids given internally, or the nitro-muriatic acid lotion or bath, *frictions* with stimulating liniments on the hypochondria, the ammoniacal and mercurial plaster in this situation, and *blisters*, will be severally beneficial in cases of this kind, as well as in the immediately preceding variety, when the energies of life are much exhausted.

72. vi. *Jaundice from Obstruction of the Ducts* (§ 35.).—When the obstruction depends upon the *passage of calculi*, as evinced by the symptoms noticed above (§ 39.), and more fully described in the article, *CONCRETIONS—BILIARY* (§ 6.), the means fully detailed in that article (§ 14.) should be resorted to; especially full doses of *opium*, alone or with antimony, of *belladonna*, or of other narcotics; the *warm bath*, *warm fomentations*, or the *turpentine epithem* on the abdomen, &c. No advantage, but rather mischief, results from the exhibition of mercurials in this state of the disease. When the obstruction arises from *compression, inflammation, and obliteration of the ducts* (§ 38.), in some part of their course, or even near their entrance into the duodenum, as from malignant tubera or other organic changes in the liver, or in the vicinity of the capsule of GIBSON, and from the organic lesions of the duodenum and pancreas already noticed, Dr. BRIGHT considers that the evacuation of fatty matter in the stools is not infrequent, especially if the biliary obstruction is permanent. In these cases, jaundice assumes a dirty or dark green hue, and is but little benefited by treatment: emaciation, exhaustion, hemorrhage from mucous surfaces, or coma, supervening, and terminating existence. Palliative means, however, should be employed, especially *opiates*, the *solution of potash*, or of the *iodide of potassium*, with extract of conium or *hyoscyamus*. The constitutional powers should be supported by mild tonics and gentle nourishment, and irritation of the stomach allayed by opiates and salines given in aromatic vehicles, or by other appropriate remedies.

73. vii. *The other States and Associations of Jaundice* require the same principles and means of cure as have been stated, according to the peculiarities of individual cases.—*a.* This especially obtains in respect of *green or black jaundice*, the most appropriate means for which have been just noticed (§ 46.); and in regard of the *complicated successions of jaundice* (§ 49.), which usually present one or other of the pathological states already considered, particularly under the first, second, and third varieties.

74. *b.* For *rachetic or pseudo-jaundice* (§ 45.), the remedies mentioned in the articles *CACHEXY, CHLOROSIS, CANCER, FUNGOID DISEASE, &c.*, may be resorted to, when these or any other malignant malady resembles jaundice, owing to contamination of the circulating fluids, or is associated with it. In such cases of contamination, as well as in the very acute and febrile form of jaundice, denominated *malignant or pernicious* (§ 58.), the alkaline carbonates with camphor, solutions of the chlorate of potash, or of chlorinated soda; and the other means advised for the hepatic complications of *Typhoid and Putro-adenic FEVERS* (§ 49.), will be most appropriate.

75. *c.* *Traumatic jaundice* (§ 52.) must be treated according to the symptoms evincing the

existence of any of the pathological states and alterations above referred to (§ 26.), and conformably with the principles already stated.

76. *d.* *Infantile jaundice* (§ 53.) requires merely gentle aperients, especially the *hydrargyrum cum creta*, with dried subcarbonate of soda and rhubarb, with an occasional dose of castor oil.

77. viii. *Of various Remedies recommended by Authors for Jaundice.*—*A. Antiphlogistics* are advised by numerous writers in the treatment of jaundice. STOLL supposed that these means are more necessary in this complaint during winter or spring, than at the other seasons.—*a. General bloodletting* is directed by HIPPOCRATES, DR. LA MOTTE, and others. ZACUTUS LUSITANUS also recommends it, but with the utmost caution. Dr. BRIGHT very properly limits it to the more acute or inflammatory cases. I have attempted above (§ 66. 67.), to point out the circumstances and varieties, in which it, as well as *local depletion*, should be practised; and have mentioned the situations where this latter may preferably be employed.—*b. Emetics* are prescribed by HIPPOCRATES, CÆLIUS AURELIANUS, HORSTIUS, LENTINUS, HOFFMANN, BROCKLEFISH, STOLL, and COCHRAN. When diffused inflammation, or even congestion, of the liver is present, or when gallstones are passing the ducts, they may be attended by some risk; but when inflammatory symptoms and pain are absent, and when the liver is not apparently enlarged or congested, they may be productive of benefit.—*c. Laxatives and purgatives* are much safer than emetics, and more generally appropriate. HIPPOCRATES, GALEN, FORESTUS, ROLAND, &c., placed great dependence upon them. Much, however, depends upon the selection of them, appropriately to existing pathological states. SCHNEIDER prefers the combination of *senna* with *guaiacum*; ORTO, *aloes* with *soap*; LENTIN and HORNE, *rhubarb* with *bitartrate of potash*; and the majority of recent writers in this country, *calomel* or *blue pill*, alone, or with other purgatives. I have found, after one or more doses of these last, that any of the former will be very serviceable, especially the bitartrate of potash in large doses, either with the sub-borate of soda (F. 790.) or with the confection of senna, or with the guaiacum, according to the pathological states inferred to exist. Other purgatives will, nevertheless, be often equally beneficial; but, in the more inflammatory cases, the more cooling should be selected: and when a torpid state of the liver, or deficiency of vital action in it, is inferred, then the warmer, more stimulating, or stomachic aperients should be prescribed, and be aided by the other means advised for this state.—*d.* The diet should also be suited to the treatment; and where depletions and evacuations are required, it ought to be most spare, cooling, and chiefly mucilaginous, or consist of the mildest of the farinaceæ.

78. *B. Diaphoretics and sudorifics* are prescribed by CÆLIUS AURELIANUS, RIBELIN, STOLL, RICHTER, &c.; and *antimonials* are the remedies belonging to this class, which are preferred by modern writers. When conjoined with other remedies, they are of much service; as with nitrate of potash, and the spirits of nitric æther, in the more inflammatory states, and with anodynes and opiates in some other circumstances.—*The warm bath*, the *vapour bath*, *fomentations*, and *warm poultices* may also be noticed under this

head, as being sometimes useful. A diaphoretic, as well as a deobstruent, effect is also produced by a combination of calomel with antimonials and opium, or of calomel, camphor, and opium; and is often of great benefit in the more inflammatory varieties, after general or local depletions.

79. *C. Deobstruents and alteratives of various kinds* are much insisted on by JENNIN, SCOTT, and most modern writers. Several of these, suitable to the more chronic cases of jaundice, are prescribed in the Appendix (F. 503. *et seq.*).—

a. The deobstruent effects of *mercury* in this complaint are much confided in by DESAULT, THOMANN, and most recent writers; but there is little agreement between them, as to the preparation which should be preferred, or as to the extent to which it should be pushed. GIBSON and others prefer *calomel*, and give it until it produces salivation. In the more chronic cases especially, I prefer PLUMMER's pill with soap and taraxacum, occasionally aided by mercurial liniments, or plaster, applied to the hypochondria.—*b.* Simple or medicated soups are much praised, by some authors, and particularly by BOYLE, STORUCK, RANOE and QUARRIN. They are often very useful, either alone, or with taraxacum, mild mercurials, oxgall, assafoetida, or with ammoniacum, or even with narcotics. The alkaline subcarbonates, and solution of potash, are also serviceable in similar combinations, and, as well as the soups, are safe medicines in all states of the disease.—*c.* Taraxacum, in decoction or extract, has been much used in jaundice, since it was praised by RANOE and QUARRIN; but it should be given in large doses, or be aided by other medicines, as the alkalies, soap, neutral salts, &c. I have given it with small doses of colchicum, and in other combinations. (F. 76, 77. 392.)—*d.* The *Solanum dulcamara* was recommended by LINNAEUS for jaundice, but it is rarely prescribed, although much used as an alterative in cutaneous eruptions depending upon, or connected with, biliary disorder. It may be advantageously given in decoction with taraxacum and the alkaline subcarbonates, or with the alteratives already noticed (F. 59.). PLUMMER's pill may be taken at night.—*e.* I am not aware that

preparations of colchicum have been recommended for this complaint by writers. I have, however, prescribed it in several cases with marked benefit, chiefly in conjunction with mild mercurials, or with soap, alkalies, &c., or with magnesia or neutral salts, according to circumstances. It should be given in small doses, be continued for a considerable time, and carefully watched. If there be much debility, or if it produce depression, it should be given with camphor, or the more tonic substances recommended for the complaint. It often increases the biliary secretion in the cases depending upon chronic inflammatory action, or enlargement of the liver; and promotes resolution of the former, and diminution of the latter, morbid state.—*f.* I have also given the preparations of *sarsaparilla* with advantage, in conjunction with the liquor potassae.

80. *f. Nitric acid* was advised by FRANK. It is likely to be useful in some of the more chronic states. The *nitro-muriatic acid* was praised by SCOTT, ANNESLEY, and others. I have found it decidedly beneficial in some cases; but have, contrary to the usual mode, prescribed it internally as well as externally. It may be

employed as a warm foot-bath, or as a lotion, applied warm or tepid, over the hypochondria and epigastrium. It is most serviceable in torpid states of the liver, and in the more chronic cases. It should not be employed when inflammatory action is present.—*g.* The chlorate of potash, or the chlorinated soda, will be sometimes useful in the circumstances or conditions of the disease in which these acids are indicated. The chlorate of potash may be advantageously conjoined with the carbonate of soda, or with other substances.—*h.* The preparations of iodine are sometimes also of service, in similar states of jaundice to those just alluded to, especially the hydriodate and the iodides of mercury. These may be given with conium or other narcotics, particularly where there is reason to infer the existence of chronic obstruction, or malignant disease of the liver, or of adjoining parts.—*i.* The liquor potassae is also indicated in such cases, and in similar combinations.

81. *D. Diuretic deobstruents* are sometimes prescribed, but chiefly as adjuncts to aperients. They are noticed by HIPPOCRATES and RIEDLIN. The acetate of potash (F. 841.) is the most useful of this class; but the bitartrate is equal to it as a diuretic, and even superior to it as a deobstruent in diseases of the liver, when given in large doses, so as to act upon the bowels, or when combined with the sub-borate of soda (F. 790.). Several of the foregoing medicines will be aided in their operation by emollient and mucilaginous diluents, as directed by GILBERT and others.

82. *E. Frictions of the hypochondria and upper regions of the abdomen* with stimulating and deobstruent liniments have received much less attention than they deserve. Indeed, they have hardly been noticed. When acute inflammatory action is not present, they will be found of much service. Several of those contained in the Appendix (F. 297. 311., &c.) may be prescribed either alone, or with iodide of potassium, or the mercurial liniment. Subsequently the ammoniacal and mercurial plaster may be kept applied to the side.

83. *F. Anodyne antispasmodics and narcotics* are directed by VOGELER, RICHTER, HILFAND, VOGEL, BRANDIS, and CONRADI, chiefly on the supposition of jaundice being often a consequence of spasm; and ipecacuanha with opium is generally adopted by them. As this complaint often gradually disappears upon the cessation or removal of the remote cause which occasioned it, much of the benefit, that seems to follow these substances, probably depends upon this circumstance. When the disorder proceeds from the retention of a calculus in the ducts, they are probably useful in relaxing the parts, and thereby facilitating the excretion of it.—*Opiates* in full doses are prescribed by WENDELSTATT, VOGELER, THOMANN, DE CHAVE, &c.; and belladonna, by GREYING. In the states just named, and when severe pain is present, the advantages derived from them are unquestionable, whether exhibited alone, or with calomel, or with alkaline subcarbonates, or with camphor and emollients.

84. *G. Oil stimulating antispasmodics, the spirit of turpentine* is the most deserving of notice. It is recommended by HOLZ, ODIER, and DURANDE. I have prescribed it with benefit in several varieties of the complaint, and in various modes, as already stated (§ 70.).—*Assafoetida* is mentioned by HERZ: both it and ammoniacum are sometimes

of use in cases depending on torpid states of the liver, especially when conjoined with soap, alkalies, and other medicines already noticed. (See Form. 503—510. 891. 894.)—An infusion of the flowers of arnica was also prescribed by PLENCZ and SROLL.

85. *H. Vegetable tonics and bitters* are directed by RIVIERUS, conjoined with aperients; and are often of great service when thus exhibited, and when aided by the alkaline subcarbonates or neutral aperient salts.—The *absinthium* is recommended by CELSUS, DE HAYDE, and SOLENNAPEN; and *cinchona*, by CAMMERARIUS, FAHNER, and DE HARN. This latter is prescribed with antimonials by CORNETTE; but it should be given with caution, as it is contra-indicated in the more inflammatory states of jaundice. I have had reason to believe it to have been even productive of the complaint, when exhibited freely in periodic fevers, before morbid secretions had been fully evacuated. The milder tonics and simple bitters are preferable to it in most cases, especially when they are pre-crit as advised by RIVIERUS, and when given during convalescence.

86. *I. Of the other means* advised by authors, there are few requiring particular notice. The watery extract of *Chelidonium*, and the extract of *Chicorium*, were recommended by RIVIERUS, LANGE, DE SCHUTTEN, and others; the *Anagallis* with salines, bitters, and the ammonio-chloride of iron, by STOLL; the *Agrimonia*, by HILL; and the *Giamen caninus* and the *Berberis vulgaris* (F. 225.), by several writers. In-piscated oil, in as large doses as the stomach could bear, was prescribed by SROLL. Blisters on the hepatic region were directed by BANG; and electricity, by HALL and DARWIN. The mineral springs of *Cheltenham*, of *Bath*, or of the *Beutha-Spa*; the artificial mineral waters of *Seidenschütz* and *Pullna*, or of *Ems*, *Figer*, and *Pyrmont*; are severally beneficial, when taken appropriately to the pathological states of the complaint. Travelling and change of air were much praised in jaundice by CELSUS and CILIAS AURELIANUS, and in modern times by GREGORY and others. Regular exercise on foot and on horseback is always of benefit, unless in cases depending upon inflammatory action.

87. The *Diet and Regimen* should be suited to the forms of the disease.—*Asses' milk* is advised by HIPPOCRATES. *Common whey and guts' whey* are the best beverages that can be used during the attack. The drinks also prescribed under the head *Potus* in the Appendix (F. 588. et seq.), will generally be found useful. Upon the whole, the diet should be very nearly as advised in the article CONCRETIONS—BILIARY (§ 18.).

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ICHTHYOSIS. — **Syn.** Derived from *ἰχθυς*, gen. *vor*, a fish. *Albas nigra*, Avicenna. *mpetigo exorticalica*; *Lepra Ichthyosis*, Sauvages. *Ichthyosis*, Willan. *Lepidosis Ichthyosis*, Young. *Lepidosis Ichthyosis*, Good. *Ichthyose*, Fr. *Fischschuppenausatz*, Germ. *Ictiosi*, Ital. *Fish Skin*, *Fish Skin Disease*.

CLASSIF. — 6. Class, Diseases of the Excrement Function; 3. Order, Affecting the External Surface (Good). 2. Order, Scaly Diseases; 4. Genus (Willan). **IV. CLASS, IV. ORDER (Author).**

1. **DEFIN.** Morbid enlargement of the papillæ of the skin, and thickening of the lamellæ of the epidermis, either in parts, or over the general surface, presenting irregular compartments, and resembling in many cases the scales of fish.

2. *Ichthyosis* is defined by WILLAN and BATEMAN, to be a papillary, indurated, and horny condition of the skin, to a greater or less extent. It has been placed by them among squamous diseases, but more recent writers have justly contended that it does not belong to this order. It consists of a morbid enlargement and elongation of the papillæ, and a thickening of the epidermis. Horny papillæ are thus formed, which spread so as to adjoin, and irregular tops, and, undergoing parterion, sometimes resemble the scales of a fish.

3. This affection is general or local, and hereditary or accidental. When it is hereditary, it either is congenital, or it does not appear until some months after birth. The local form is most frequently accidental, the more general affection is commonly congenital or hereditary. The states of the complaint have been differently divided, and even described, by writers. The division and description of Dr. A. T. THOMSON, are altogether incorrect, inasmuch as he confounds, as M. RAYE has shown, a disease of the cutaneous follicles with this affection, and mixes up a description of both, under the denomination of *Fortuitous Ichthyosis*.

4. **I. DESCRIPTION.** — i. *Hereditary Ichthyosis* is commonly general, affecting those places chiefly in which the skin is naturally thick and the epidermis rough, and being entirely wanting on the prepuce, eyelids, groins, axillæ, and on the palms of the hands and soles of the feet. When the disease is congenital, it is usually but little apparent; but the skin, instead of being soft and smooth, is sallow, dry, and shagreen-like. In the course of

the two first months, the cuticle becomes, particularly in places, rough, thick, and of a greyish or sallow hue. It may remain in this state for years, or even during life, without proceeding further; but the alteration may increase until it is very remarkable. — *Ichthyosis* sometimes does not appear until several months after birth. It is then often developed more rapidly, until the epidermis is divided into small irregular compartments, resembling that covering the legs of fowls, or the scales of serpents, the "*Ichthyose nacrée serpentine*" of ALIBERT.

5. Hereditary *ichthyosis* is sometimes limited in extent, and is confined chiefly to the extremities. It is then still more remarkably developed, and assumes the appearance of a thick epidermic layer, or of the bark of certain trees. In these cases, as in the foregoing, the epidermis is composed of a number of small compartments of irregular shapes, which are not imbricated, are from two to three lines in diameter, but are often broad in proportion as they are thin. The morbid surface is generally greyish or sallow; sometimes of a brownish hue; but, in a few cases, it is shining or opalescent. It is so rough, that it feels like shagreen, or like the surface of a file, when the hand is passed over it, "*Ichthyose nacrée cyprine*" of ALIBERT. — In these states of the complaint, the epidermis is chiefly altered; and the scales, excepting the lamellæ, which adhere strongly, may be removed without causing much uneasiness. But, however detached, they are soon reproduced.

6. ii. *Papillary Ichthyosis*, or that in which there is chiefly a remarkable elongation of the papillæ of the skin, is a very rare variety. The first case of this kind, which was minutely described, was that of a native of Suffolk, who exhibited himself, in 1710, under the name of the *porcupine man*. More recently a family of the name of LAMBERT, affected with this variety, were described by GIORGIO ST. HILLARIE, and others. About 1830, I examined a very remarkable case, which was seen by many of the medical men of the metropolis. In all these instances, the complaint was confined to the males of a family. The brothers LAMBERT could trace it back through five generations, all of which were affected with it. The alteration of the skin appears to have been the same in all the cases, and identical with that which I examined. The papillæ were remarkably hypertrophied and elongated, over nearly the whole of the cutaneous surface, excepting the prepuce, axillæ, groins, eyelids, soles of the feet, and palms of the hands. Over the rest of the body, the elongated papillæ presented the form of short spines closely pressed together. They were whitish or greyish when separated, but blackish or brown on their exposed surface: and so hard and elastic, that they produced a noise when the hand was passed quickly over them. These productions have generally exuded a reddish brown serum, when divided close to their bases, and have soon been reproduced. They could not be removed without pain.

7. iii. *Accidental and Local Ichthyosis* is a very distinct form of the disease from the foregoing, and is generally produced by pressure. It sometimes occurs on the lower and anterior parts of the thighs of shoemakers; and in other parts, where pressure is made, in various employments. It thus resembles corns in its mode of production.

8. In the several forms of *ichthyosis*, the morbid

cuticle is generally thrown off in summer, or at other seasons, but it is soon after reproduced. RAYER states that the skin, divested of its squamæ, shows no appearance of inflammation; and that its colour is natural, only the shallow furrows on the surface are more remarkable than usual. The cutaneous perspiration and follicular secretion are suppressed. The complaint is not attended by pruritus, or by any other morbid sensation: the general health is unaffected by it. When it is general, copious perspirations take place from the soles of the feet, palms of the hands, and other parts above stated to be free from it. The pulmonary exhalation and urine are probably increased, in proportion to the diminution of the cutaneous exhalation. RAYER thinks, that persons affected with ichthyosis are liable to be attacked with acute inflammation of the skin, which throws off the morbid cuticle; but the original complaint is soon afterwards reproduced.

9. iv. *The Anatomical Changes* constituting ichthyosis have been described by TILLSIUS, BUNIVA, and RAYER. The small compartments, into which the epidermic layer is divided, do not overlap each other like the scales of fish: hence the term ichthyosis is inappropriate. These layers, according to BUNIVA, consist chiefly of gelatine, hardened by phosphate and carbonate of lime. M. DELVIGNE states, that they contain also traces of iron and of silica. They present the same chemical constituents as the hair, nails, &c. The lines or furrows of the surface of the corion are more distinct, and the papillary eminences more decided, in this complaint, than in the natural state. TILLSIUS found the cutaneous follicles obstructed, and full of a thick substance, in the *papillary variety* (§ 6.); and in the *squamous varieties* examined by RAYER, these follicles were but little apparent, or imperceptible. Dr. MARTIN observed the hair and hair-bulbs remarkably enlarged; and the corion is usually thicker, harder, and denser than natural. Ichthyosis appears to be unconnected with any internal disease.

10. II. *DIAGNOSIS*.—This affection is improperly classed by WILLAN and BATEMAN with squamous diseases, for it is entirely independent of inflammatory action. True ichthyosis always commences in a few months after birth, if it have not already existed; for the local variety can hardly be considered as connected with it, otherwise than in external appearance, and in the absence of inflammation. — In *lepra*, *psoriasis*, and *pityriasis*, the formation of scales is constantly preceded by redness of the skin: *lichen* is attended by severe pruritus, and preceded by the eruption of papulæ; and the scaly condition of *chronic eczema* is quite distinct from local ichthyosis. Ichthyosis, on the contrary, is attended neither by heat nor by pruritus, and is perfectly free from every inflammatory symptom. The *horny or warty productions* on the skin, — the former of which has been classed by WILLAN and BATEMAN with this complaint, — are entirely different from it, not only as to the form of the morbid formation, but also as to the extent of surface affected; these productions being limited to one or more points of the cutaneous surface.

11. *The ichthyosis of the face*, noticed by Dr. BATEMAN and Dr. A. T. FLEMING, has been more correctly described by M. RAYER, who has shown it to consist of a *sebaceous deposit* from diseased follicles. I have met with one instance of this

affection, extending over, and on both sides of, the nose. It is always associated with inflammatory action, in its developed state. The following is the description of it by RAYER: — "The part of the integument affected, becomes, at first, unctuous or oily: the secretion of the sebaceous follicles then increases; the fluid thrown out upon the surface acquires additional consistency, and finally forms a kind of *squamous crust or layer*, of greater or smaller extent. Soft at first, and adhering but slightly, it by and by acquires hardness and then cannot be removed without very considerable pain. The skin under this sebaceous deposit is of a *livid red*; the orifices of the follicles appear dilated, and sometimes distended with concrete sebaceous matter."

12. III. *CAUSES*.—M. RAYER considers general ichthyosis to be a not infrequent disease. He has seen upwards of forty cases of it. It is known to be transmitted through several generations, and only to the male offspring. The whole of the male children of the same father and mother, who were themselves free from it, have been affected with ichthyosis. This was the case with two brothers, one of whom was in the Hospital "*De la Charité*," in 1827. This disease is very seldom produced accidentally long after birth. Neither climate, nor temperature, nor mode of life, exercises any influence in causing it. Some have ascribed it to moral affections of the mother during pregnancy; but this is extremely problematical. That it may be congenital, without the parents having been affected by it, is shown by a fact stated by RAYER — He was consulted respecting three little boys who had it congenitally. Both parents were quite healthy and well forward, and the mother had never experienced disquietude nor alarm during these three pregnancies. It is very rarely observed in females.

13. IV. *PROGNOSIS*.—Hereditary, or congenital ichthyosis, frequently disappears for a time in consequence of acute inflammation of the skin; but a person affected with it can hardly be considered as likely to be permanently cured of it. Local and local ichthyosis, however, offer no aid to treatment.

14. V. *TREATMENT*.—i. *Hereditary* considerable extent has rarely been cured. M. RAYER states, that he has not succeeded in a single case. Happily this alteration of the skin is unattended by internal disorder, and is thus, comparatively, of little consequence. Emollient applications long continued, gentle frictions, mucilaginous and soothing fomentations, tepid baths frequently repeated, or alternated with the watery vapour, or the alkaline warm bath, have been severally employed in clearing the skin from the scales covering it, or in preparing it for the application of other remedies. WILLAN and BATEMAN prescribed without benefit various plasters, stimulating lotions, and other topical applications. Mr. COULSON resorted to a wash containing corrosive sublimate, in a boy, who was under his care; and subsequently, a liniment consisting of half an ounce of the tincture of nitrate of mercury and an ounce of olive oil, which was applied twice in the day. The scales soon disappeared, but the brown colour of the skin still continued. WILLAN recommends tar and pitch for this complaint; and gave as much as half an ounce, or even an ounce, daily, for some months:

and BATEMAN adopted the same treatment, with advantage both to the local affection and to the general health. Dr. ELLIOTSON, for one of two brothers affected with ichthyosis, prescribed a warm bath every day, and desired the patient to anoint himself, on coming out of it, with oil; gentle friction of the surface, with sweet oil being employed twice a day besides. Pitch was also given internally, and increased gradually until ten scruples were taken three times in the day. The patient was clothed in flannel; was advised never to wipe the surface of his body after having anointed himself; and was directed to wear the same flannel shirt, drawers, and stockings, so that his skin was kept impregnated with oil. In about six or seven weeks the disease disappeared, the skin being soft and supple. The pitch produced no effect on the organs of digestion; and it neither was mixed with, nor had altered the smell of, the evacuations. Dr. ELLIOTSON refers to two instances of the disease having been cured by Dr. WILLAN, by the use of pitch taken to the extent of an ounce daily. In Dr. ELLIOTSON'S case, no benefit was derived from the warm bath, as it produced smutting of the surface after the removal of the thickened cuticle; but the use of the oil probably accelerated the cure. The arsenical solution has also been tried, but with either very little or no benefit.

15. n. For local or accidental ichthyosis, flying blisters, or topical stimulants, have been directed. Gentle frictions with a flannel cloth after coming out of a simple or sulphureous tepid water bath, and the sulphureous fumigating baths, aided by active exercise, have been found most serviceable in this form of the complaint. Mr. PLUMBI succeeded in two cases, in removing this alteration of the skin, which was limited to the legs, by strapping the parts tightly with adhesive plaster, and applying a roller kept constantly moist with cold water. The straps were removed every fourth or fifth day. On the whole, this affection has been found to be very little under the control of medicine; and, notwithstanding the most active treatment has been adopted, the disorder has been known to persist several years, with occasional variations.

Preparation. Affection of the sebaceous follicles of the face, mistaken by Dr. A. T. THOMSON for ichthyosis, was successfully treated, by the decoction of the dock root, or the *Rumex obtusifolius*. It is prepared from one ounce of the sliced recent root, boiled in two pints of water down to one pint. The dose is a wine glass full three times in the day. It may be taken alone, or with the arsenical solution; if it should purge too briskly, a few drops of the tincture of opium may be added to each dose.

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ILEUS. — See Colic.

IMPETIGINOUS AFFECTIONS. — SYN.

Impetigo (from *impeto*, I attack or infect), Celsus, Pliny. Λιχην αλφες, Galen. *Lepra Squamosa*, Auct. var.; *Herpes*, *Phlyctæna*, Lichen, &c., Auct. *Phlysis Impetigo*, Young. *Epycypsis Impetigo*, Good. *Dartre*, *Dartre croûteuse*, Fr. *Zittermal*, Ringworm, Germ. *Impetigine*, Ital. *Tetter*, Humid or Running Tetter.

CLASSIF. — 3. Class; 3. Order (Cullen). 6. Class; 3. Order (Good). 5. Order, Pustular Eruptions (Willan). III. CLASS, I. ORDER (Author).

1. DEFIN. — An eruption of one or more crops of small, yellow, itching pustules, disseminated or collected in clusters, the contents of which dry up in a short time, and assume the form of yellowish, rough, or prominent incrustations; generally unaccompanied by fever, and not contagious.

2. 1. DESCRIPTION. — *Impetigo* may attack every part of the body. It may be simple or complicated. WILLAN, BAILLAIN, and BIERER enumerate five species of the disease. I agree, however, with Dr. A. T. THOMSON, in limiting them to two; three of these proposed by WILLAN being merely varieties of simple *impetigo*. The first species, or simple *impetigo*, according to this view, is unattended with fever, and comprises the figured, scattered, and scabid varieties. The second, or complicated, or erysipelatous species is attended with fever, owing, probably, to the extension of the inflammatory action to the more deeply seated integumental tissues.

3. i. *Simple Impetigo* — *Impetigo simplex* — usually occurs without any premonitory symptoms or derangement of health. It is met with most frequently in children at the period of dentition, in young persons of either sex, and in those of a sanguineous and lymphatic temperament, with a fine susceptible skin and florid complexion. It most commonly appears in the spring, at which season several have been periodically attacked by it during many successive years. This species occurs principally under two varieties. The pustules may be collected in circular or oval groups, occupying a surface of greater or less extent, but pretty exactly circumscribed: this variety constitutes the *Impetigo figurata* of WILLAN. Or the pustules may be scattered far apart, assuming no particular form, but disseminated over a surface of variable extent: this variety has been called *Impetigo sparsa*. To these a third division has been added, by the name of *Impetigo scabida*, but this is merely a more severe form of *impetigo sparsa*. Many intermediate degrees exist between these varieties; but the characters they present are

sufficiently distinct to give scope to the general study of the disease. At the same time each variety may be acute or chronic, according as it consists of a single crop, or of successive eruptions, of pustules.

4. *A. Impetigo figurata* — *Dartre crustacée flavescens* of M. ALIBERT — is the most common of these affections. It may occur in any part of the body, — on the neck, trunk, and extremities, particularly the hands; but it generally occupies the face, appearing most frequently on the middle of the cheeks, from whence it extends, in a circular or oval direction, over a considerable extent of surface. Sometimes it is confined to the eyelids, when it is commonly complicated with ophthalmia; and occasionally it appears on the chin, the alae nasi, and immediately below the margin of the septum of the nose. Although this variety usually occurs without very manifest disease of the general system, yet it not unfrequently follows anxiety or other depressing affections of the mind. In this case it is ushered in by a feeling of lassitude, by disorder of the digestive functions, by weakness and uneasiness, accompanied by pain in the epigastric region, and sometimes by cephalalgia. The eruption, as it first appears on the face, commences by one or more small, red, and very superficial blotches, which itch considerably, and gradually enlarge, becoming covered with small, yellowish, pyodricious pustules, placed so close to each other as to be almost confluent, and surrounded by a red inflamed border. The pustules are but slightly elevated, and are the seat and source of much heat and stinging pain. These clusters, which are usually of a circular or oval form; and of various dimensions, may continue isolated, or extend still further by the development of fresh pustules at their circumference; and the eruption may be so extensive, that both cheeks, and even the whole chin, may be covered with it at once. The pustules, however, do not remain long in this state; but in the course of thirty-six or forty-eight hours, or at most three days, they burst, and discharge an ichorous fluid, which dries quickly and is converted into a yellowish crust of greater or less thickness; very friable, slightly furrowed, semitransparent, and resembling portions of candied honey, or the concrete gummy exudations on a cherry-tree. At the same time the discharge continues under these crusts, thereby increasing their thickness, and causing them to extend considerably beyond the limits of the original pustules; and it is usually at this stage of the disease that the patient is seen by the practitioner. The skin in the circumference of these incrustations is of a red colour; and if the scabs fall or are rubbed off, the integuments under them appear likewise red and excoriated, exhibiting at the same time minute pores, from which a purulent discharge exudes, which greatly augments the heat and smarting. Towards the edges of these diseased patches may be still seen some unbroken pyodricious pustules, and others over which the liquid has flowed when it is scarcely coagulated. If the disease be of great extent, the features can hardly be recognised.

5. *Impetigo figurata* continues in its crustaceous state from two to four weeks, when it is not protracted by successive eruptions: the itching and heat then abate, as well as the morbid secretion; the incrustations become drier, and fall off irregu-

larly, leaving one or more red spots or marks, which remain visible for more than a month. The cuticle at the same time is so thin, as to be liable to excoriation from the slightest friction, and a very trifling exciting cause often brings back the disease. More frequently, however, the ichorous discharge is reproduced, accompanied with fresh crops of pyodricious pustules; the eruption is repeatedly renewed after running its usual course, and thus continues for many months, sometimes for years. In this manner it becomes a chronic disease, although the successive inflammations keep it always in an active state. In these cases the inflammation does not spread superficially, but penetrates the whole thickness of the skin, and sometimes affects the subcutaneous cellular tissue. When the disease yields either spontaneously, or to medical treatment, the amendment commences in the centre of the patches; and even when this occurs, not infrequently the edges retain their diseased character, and fresh pustules are produced: these, however, as the treatment proves successful, also gradually disappear; and the skin regains its natural colour slowly in these parts.

6. *Impetigo figurata* may appear on the limbs, and even on the body. When it affects the lower extremities, the patches are usually large, and of an irregular oval, whereas they are smaller and rounder on the upper limbs. Sometimes the patches enlarge by successive marginal crops: this has been observed on the legs, which have thus been gradually covered from above the knee to the ankle. The disease often becomes chronic, and the time of its duration varies. In such cases, we do not observe successive and abundant crops of pustules, or these large inflamed patches, but merely a few occasionally. Frequently, however, no pustules are found; but the peculiar form of the patches and crusts, with the partial eruption from time to time, suffice to characterise it. In some instances the pustules are intermixed with transparent vesicles, as in some of the varieties of *herpes*. When this intermixture occurs, the disease is much more troublesome, and is attended with irritation, itching, smarting, and burning, in company with it, and is much more violent. Dr. Ross says, "When these vesicles break, they discharge a more acrimonious fluid, and much more acrimonious than that of the pustules, which, wherever it touches the sound skin, produces a vesicular inflammation and a painful eruption." This variety of the affection appears principally on the hand, about the metacarpal bones, or on the wrist. The vesicles appear in slow succession at a little distance from each other and from the pustules; when broken, they are little disposed to heal; and the cuticle ultimately becomes thickened and inflamed, and covered with the rising eruptions, small humid ulcers, and claps or fissures. The sensation of burning and intense itching is extremely distressing, especially on the first rising of the vesicles; and every remedial application, which is employed, becomes a source of irritation, and increases the evil.

7. *B. Impetigo sparsa* differs from the preceding variety merely in the irregular and scattered distribution of the eruption. Its nature and progress are the same; but, instead of being arranged in circumscribed groups, its pustules are dispersed without any regular order over the extremities,

neck, face, shoulders, and external ears. This variety is most prevalent in autumn, continuing obstinately throughout the winter, and disappearing only at the approach of summer. It has a greater tendency to pass into the chronic state than the last variety. Although it may develop itself on any part of the body, yet it affects more particularly the extremities, manifesting an especial predilection for the legs, and in that situation becoming extremely troublesome and obstinate.

1. Sometimes it confines itself to one spot alone; at others, it covers a whole limb, or even more than one at the same time.

8. The pustules in *impetigo sparsa* are developed in the same manner as in *impetigo figurata*; but here, instead of being collected together, they are scattered irregularly over the diseased surface, and accompanied with insupportable itching. The incrustations also, which follow the bursting of the pustules, are thicker and more friable, and not formed into so large plates as in *impetigo figurata*: the attendant inflammation is, however, more extensive; and as they fall off and disappear, the surface of the limb becomes studded with ulcerations and fissures. Oedema is not an infrequent attendant or consequence of this variety of the disease.

9. In some cases, and especially in persons of advanced age, with enfeebled constitutions, the crusts attain a great thickness: they are of a yellowish brown colour, variously divided by deep fissures. They have been compared to the bark of a tree by WILLAN, who calls this variety *Impetigo scabida*. It is, however, nothing more than a severer form of the last variety. Sometimes these crusts cover a whole limb, till it is cased with them, the motion of it becoming both difficult and painful; at the same time considerable heat and a tormenting itching exist. After a while, these crusts split; and, when a portion of them is detached, a copious discharge exudes from the excoriated surface, quickly concretes, and fills up the vacancy. When this variety affects the lower extremities, and is very severe, it sometimes occasions oedema, inflammation and ulceration, especially to the toes and secreting nails — *Onychia Impetiginodes*. The inflammation and ulceration commonly appear about the ankles, particularly in aged, weakly, or broken-down constitutions. The ulcers are uneven; and either discharge a sero-purulent fluid, or are covered by yellowish crusts; their edges being irregular, purplish, or livid, and often crowned with small sanguinolent pustules. When this variety occurs in the upper extremities, it does not differ from that already described, but it is much less severe, and its chronic form more rarely associated with oedema and ulceration, than that observed in the lower extremities. Acute *impetigo sparsa* of the face usually presents greenish yellow incrustations, dispersed over the cheeks or adhering to the beard in the adult. In children, the inflammation often extends to the nose, which swells, and is sometimes plugged up; the disease then frequently becoming chronic.

10. *C. Impetigo Favosa*. — This variety is merely *impetigo sparsa* affecting the neck, ears, and hairy scalp — the *Porrigio favosa* of WILLAN, and *Tinea granulata* of ALIBERT — especially of children, and occasionally of adults. It occurs most frequently in the back parts of the head, but the

entire scalp may be implicated; and it appears as yellowish white pustules, irregularly scattered over the hairy scalp, and attended by inflammation and pruritus, their centres being traversed by hairs. In from two to four days, the pustules pour out a fluid, which agglutinates the hair, and dries into small brownish or greyish, rough, and irregular crusts or masses like candied sugar. These become friable and detached from the surface, but adhere to the hair, which often seems filled with them; a faint, sickly, or unpleasant smell being exhaled from the head, when cleanliness is neglected. *Pediculi* multiply rapidly, and swarm in the hair, which is not lost, but is often agglutinated or matted by the discharge. — *Impetigo* of the hairy scalp is not contagious, and does not implicate the piliferous bulbs, like *furis*, or true *porrigio*. It seldom lasts longer than some months; and it commonly is removed in the course of a few weeks, with proper treatment. When it becomes chronic, the inflammation often extends to the cellular tissue underneath, giving rise to small circumscribed abscesses. The lymphatic glands of the neck are frequently enlarged and painful. — RAYER and GRELIN consider that this affection of the scalp is strictly a form of *Impetigo sparsa*, and not a variety of the disease, to which WILLAN has applied the term *Porrigio*; and I am of the same opinion.

11. ii. *Complicated Impetigo*. — *A. Impetigo Eczematosa*. — *Impetigo* is sometimes associated with *Eczema* — *Eczema Impetiginodes*. (See art. *ECZEMA*, § 5.) The eruption so frequent in infants during suckling and teething, commonly called *Crusta Lactea*, or *Milk Scall*, is evidently an association of this kind, chiefly affecting the face, and extending partially to the scalp; the characters of *eczema* predominating in some infants, and those of *impetigo* in others. Occasionally it assumes nearly the appearance of *impetigo figurata*. It has been variously arranged by writers on diseases of the skin, who have, even to the present day, been more desirous to point out, and even to feign, distinctions, than to trace the changes which these diseases undergo, and the connections which subsist between them, or to show how frequently the one runs into the other; and has been termed *Impetigo larvalis*, *Impetigo mucosa*, *Tinea lactea* (SAUVAGES), *Tinea benigna*, *Tinea muciflua* (ALIBERT), *Porrigio lactea*, *Porrigio larvalis* (WILLAN, BATEMAN), *Lactumen*, *Eczema lactea*, &c., according as it was supposed to be allied to *Impetigo*, *Porrigio*, or *Eczema*. This of itself is sufficient to show the very intimate relation of these affections to each other, and to point out the necessity of considering them in their natural conditions, and in connection with their particular seats, and with the states of vital action; and not merely with reference to certain artificial distinctions, which often cannot be ascertained, and which sometimes do not exist. The differences between *vesicles* and *pustules*, so much insisted on in the classifications usually adopted at the present time, often do not exist, or exist not in such a manner as to become available to the practitioner. These, and numerous others, so implicitly received as matters of belief, may be useful, as a part of the craft of the adept; but they are of very minor importance in the estimation of the truly philosophic observer, and are valued by him for just as much as they may be worth, in the particular cases in which

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they are manifest. An eruption may be vesicular to-day, and pustular to-morrow; or, in other words, the former, owing to changes in the vital actions of the part affected, and in the morbid secretion, may pass into the latter; or both kinds of eruption may be coexistent or coëtaneous, either in the same, or in different, situations of the same case. Instances will also occur, in which the most acute observers will be puzzled to determine whether the primary eruption is vesicular or pustular; for it may be intermediate as respects the appearance both of the contained fluid, and of the containing and surrounding tissues. To whatever genus this eruption may be referred, — whether it be dignified in being described as a genus of itself, or be viewed as merely a species, or be debased to the rank merely of a mongrel variety, — it is consolatory to know, that, in its intenser states and more extended forms, as well as in slighter grades, and however great the attendant pruritus and pain may be, or however deep the chaps or fissures may seem, no permanent marks or cicatrices are produced by them.

12. *B. Impetigo Erysipelatodes* is easily distinguished, by presenting, at its commencement, the ordinary symptoms of erysipelas. The other varieties of the eruption are in general unattended by any febrile disturbance, although the digestive organs may be more or less disordered. But this is ushered in by decided symptoms of constitutional commotion. Its premonitory stage is characterised by perturbation of the system, fever, much burning and smarting heat, an oedematous state of the eyelids, and a redness and puffy swelling on the upper part of the face. This state of things continues for two or three days; when, on running the finger over it, the surface, instead of the smoothness of erysipelas, is found to exhibit a slight inequality; and on minute examination it seems papular. In a day or two more it is covered with numerous psoriasis pustules, which first appear below the eyes, but soon cover the greater part of the face, and sometimes extend to the neck and breast. The itching, smarting, and sense of heat, which accompany these pustules are very distressing. When they break, a hot acid fluid exudes, which irritates, and often excoriates, the sound surface on which it flows. The face remains in this painful condition for ten or fourteen days, when the discharge diminishes, and concretes into thin yellowish scabs, in the interstices between which, fresh pustules arise at intervals with renewed heat and pain, and run the same course as the former. The disease may continue thus severe and troublesome for two or three months. The period of its duration, however, is uncertain; and when it disappears, it leaves the cuticle in the same dry, red, and brittle state, which characterises the departure of the other varieties of impetigo. During the progress of this disease, the health of the patient is not very much disordered, and the constitutional disturbance is much less than in erysipelas. This form of the disease is occasionally confounded with *eczema impetiginodes*. In the advanced stage, however, the distinction is easily recognised.

13. Besides the above varieties of *impetigo*, WILLAN and BATEMAN mention another, under the title of *Impetigo rodens*. It is, however, of very rare occurrence, and cannot with propriety be called an impetiginous disease, being more of

a malignant ulcer, complicated. L. v. c. 2. It is said to be uniformly fatal, and is benefited by no remedies, either external, which have been employed for

14. II. DIAGNOSIS. — The varieties are liable to be confounded with other eruptions, especially *porrigo*, *eczema*, and with *eczema*; but a careful inspection of the pustules and of the incrustations, as either may present themselves, will show the differences between them. — *a.* The clusters of *impetigo* are distinguished from the circles of *porrigo*, in not continuing to pour forth a purulent and glutinous discharge, but, after the first eruption, an ichorous humour; and in not forming those thick soft and copious scabs, which characterise the latter disease. The pustules of *impetigo* discharge, while those of *porrigo*, seated more deeply, are quickly changed into dry, yellowish-coloured, cup-shaped scabs. The crusts of the former are brown, or of a dull grey, and not broad, thick, nor continuous, as in *porrigo scutulata*. *Impetigo* of the hairy scalp is not likely to be mistaken for *porrigo lupinosa*: it does not implicate the piliferous bulbs, like this and the other varieties of *porrigo*. It is distinguished, however, with greater difficulty, from *eczema impetiginodes* affecting this part, the principal difference being in the appearance of the incrustations; but, as already insisted on, these latter are very nearly related eruptions. — *b.* The diagnosis between *impetigo* and *scabies* depends on the distribution of the eruption in patches; the copious exudation of ichor; and the reddened, rough, and fissured cuticle; and the heat and smarting, which accompany the itching, in the former. In the strictly purulent scabies, the pustules rise to a much greater elevation and magnitude, than in this complaint, and are filled with a thick, yellow pus, and are more inflamed around their base. *Porrito* and scabies are contagious; but none of the varieties of *impetigo* possesses this property. — *c.* In its more advanced stage, *impetigo* may be mistaken for *psoriasis* or *lepra*; but in these, there are no laminated concretions, no ichorous matter or the squamæ composed of exfoliations of morbid scales. Scaly diseases emit no fluid; and the crusts, after the cessation of a discharge, however slight, to determine the impetiginous eruption. — *d.* The pustules of *psoriasis* are larger, and not so yellow, and are more isolated and more prominent, than those of *impetigo*; which are always much crowded, and secrete abundantly. The scabs of the former are drier and of a deeper colour than the crusts of the latter; and are reproduced only after a fresh eruption of pustules. The crusts in *impetigo* are greenish yellow, thick, semitransparent and reproduced without any renewal of the pustules. In *psoriasis*, also, the pustules do not break till the fifth, sixth, or seventh day; whilst in *impetigo* they burst on the third or fourth. Moreover, tubercles and indurations are observed in the former, but not in the latter. — *e.* *Impetigo* is more likely to be confounded with *sophistic eruptions* on the face; but the peculiar character of venereal desquamation, or the firmly adherent scabs, concealing ulcers and leaving indelible cicatrices, sufficiently distinguish the latter from the former. Some of the forms of *eczema* may be mistaken for *impetigo*, but the diagnosis has been fully stated in the article *ECZEMA* (§ 13.). The

neck, face, should be observed will detect the very variety in its occurrence between *acne rosacea* and this eruption. Mr. DENBY states that the internal use of the dento-ioduret of mercury often produces vesicles, followed by yellow or yellowish green scaly crusts, which may be easily mistaken for those of impetigo and porrigo.

15. III. PROGNOSIS.—This is more favourable in impetigo than in lichen, tinea, psoriasis, eczema, and many other cutaneous eruptions. In whatever part of the body the disease, in its acute state, be situated, it generally yields to medicine in two or three weeks. Its duration in the chronic form cannot be stated with precision; as this necessarily depends on the constitution of the individual, the number of the eruptions, and the existence of other particular conditions, such as scrofula, pregnancy, amenorrhoea, the change of life, &c. When chronic impetigo occurs on the head, on the upper lip, or any other region covered with hair, it often proves a very obstinate and troublesome disorder; especially if the patient be of advanced age, of a scrofulous diathesis, or of a shattered constitution. But, under no circumstances, can it be regarded as attended by danger. The sudden suppression of the most severe forms of the eruption, particularly those affecting the face and scalp of children, may, however, be productive of most serious disease.

16. IV. CAUSES.—Impetigo is not communicated by infection. It is most frequently observed among the poor, ill lodged, badly fed, and filthily disposed classes. Its exciting causes are, however, sometimes obscure. Individuals of a sanguineous or sanguineo-melancholic or lymphatic temperament, and scrofulous constitution, with a thin, soft skin, are most liable to it. In them it is occasionally excited by violent exercise, by intemperance of any kind, by the depressing passions of the mind, grief, disappointment, fear, &c. It is very often preceded by headache, languor, and disorder of the alimentary canal, and cannot be traced to any other exciting cause than this disorder. Infants of the breast, and children during teething, are particularly the lymphatic class, and are most liable to the various forms of impetigo on the face and scalp. Young persons are sometimes attacked with that of the face, on exposure to a hot sun. Females, on the appearance, and on the cessation, of the catamenia, are also apt to be affected with this complaint. Several external causes may, however, excite pustules of impetigo, by acting directly on the skin. Persons who handle irritating substances, as raw sugar, lime, or metallic dust, often have impetiginous eruptions on the hands. BATEMAN regards the pustules, caused by the ointment of tartarised antimony, as a species of this disease; but they are of an entirely different character, and cannot be classed among any of its varieties. I believe, that disorder of the digestive organs, and accumulations of mycous scordes and other secretions in the *prima via*, more commonly occasion impetigo than is generally supposed. I scarcely have seen a case, in which this derangement was not manifest either before, or in the course of, treatment; and in which this eruption was not evidently symptomatic of it. In this opinion I am supported by Mr. DENBY, my late colleague at the Infirmary for Children, where cases of this kind came frequently before us.

17. V. TREATMENT.—i. Whatever be the variety of simple impetigo, one mode of treatment is indicated. In the commencement of the disease, WILLAN and BATEMAN recommend the internal administration of sulphur, but not in sufficient quantity to produce purging; and if there is much inflammatory irritation of the cuticle, soda, nitre, or the bitartrate of potash, with which some of the vegetable acids, as citric acid, or lime juice, may be advantageously combined. The indiscriminate employment of sulphur has, however, sometimes aggravated the symptoms, and favoured the re-appearance of the eruption. I have prescribed, with marked benefit, the sub-borate of soda in emollient vehicles, either with or without small doses of nitre, or of the bitartrate of potash. Bloodlettings, either general or local, have been proposed in extensive attacks of impetigo figurata, and in plethoric individuals may be of advantage; but, in general, they are not productive of benefit, and in persons of a weak and scrofulous habit of body are detrimental. If the eruption is attended by much fever, calomel and antimonials, or other mild mercurials, cooling saline solutions, and diaphoretics with diuretics, will be of service.

18. Locally, emollient fomentations, such as the decoction of mallows, digitalis, poppy heads, &c., and ablation with tepid water, are of the most essential service in the incipient stage of this disease, especially of the common saline mixture, with conium, be given at the same time. At a later period, saturine or alkaline lotions, and the application of the ointment of the acetate of lead or oxide of zinc, will accelerate the cure, and will be often sufficient to effect it.

19. ii. When this affection occurs in children at the period of dentition, simple cleanliness is frequently all that is required. Here the eruption is occasionally accompanied by a manifest improvement in the constitution, and it would be highly imprudent, and even injurious, to check or repel it. If it occurs on the hairy scalp or face (§ 10.), the hair must be removed, and emollient applications resorted to. Where there is much local inflammation, or in plethoric children, leeches ought to be applied behind the ears. Saline purgatives, as the sulphate of soda, sulphate of magnesia, or tartrate of potash and soda, may be given with advantage in these cases, in doses of from two drachms to half an ounce daily.—If the disease, wherever occurring, proves obstinate, it has been usually treated by an alterative mercurial course, particularly *Plummer's pill*, or the *hydrargyrum cum creta*, with the decoction of sarsaparilla or cinchona; but a more beneficial effect has been derived from the exhibition of five or six grains of calomel at bedtime, followed by a brisk cathartic the next morning, and a moderate dose of the liquor arsenicalis, taken three times a day, in the decoction of elm bark.

20. iii. As to local means, almost every variety has been tried in this disease. In some instances the patient cannot bear the most soothing and emollient applications; while, in others, the most stimulant have been employed with advantage. Where the irritation is insupportable, the use of the hydrocyanic acid has been suggested by Dr. A. T. THOMSON, in the proportion of one fluid-drachm to four fluid-ounces of water, combined with one drachm of alcohol, and six or eight grains of acetate of lead; and subsequent expe-

rience has shown the value of this application. It soothes the irritation, and disposes the skin to regain its healthy action: but it must not be applied without caution; as cases have been recorded, where it became absorbed into the system, and produced depressing effects on the constitution, with considerable intermission of the pulse. These unpleasant symptoms, however, ceased on discontinuing it. It is useless to apply any local remedies, until the thick incrustations, which occur in *impetigo scabida*, are removed by emollient poultices, or by a weak decoction of poppies, or by exposing the surfaces to the vapour of hot water, &c. Any of the mild ointments before mentioned may afterwards be applied, and the surface should be covered with pledgets of soft lint, or the whole should be touched with a solution of *nitrate of silver*; or, if the skin is not very irritable, and the attendant inflammation but slight, while at the same time the disease has become chronic, the baths of Harrowgate, or artificial fumigations of sulphur, the hot air and vapour baths, and the alkaline and sulphureo-gelatinous baths will frequently both procure the removal, and prevent the recurrence, of the eruption. But in the more inflammatory cases, and in plethoric persons, bloodletting should precede a course of these baths. With the same intention, the baths of Barèges, Louche, Caunterets, Engliem, and many other Continental springs, have been recommended. Great benefit has also been derived from the warm sea water bath, especially when followed by a course of sea bathing; it should, however, be remembered that salt water is injurious during any actual inflammation. But great discrimination is always required in the treatment of this eruption. Where there are much inflammation and irritability of surface, the internal remedies should be of a cooling and sedative nature; and the external applications, emollient and palliative;—in an opposite state, the *arsenical solution* may be given; and slightly stimulant ointments, such as the ointment of nitrate of mercury diluted with six or seven parts of simple ointment, or an ointment of tincture of bismuth, may be applied. — In all cases, the diet of the patient should be restricted, and animal food taken in very moderate quantity: milk and farinaceous food are the most appropriate. Fermented liquors, spirits, and wine, ought to be strictly forbidden.

21. iv. In *impetigo erysipelatos*, antiphlogistic means must be early adopted. *Purgative medicines*, especially the infusion of senna with full doses of the alkaline carbonates, and the neutral salts with antimonials and nitre, will materially alleviate the fever; but when the discharge is copious, and incrustations begin to be formed, the greatest benefit will be derived from the decoction of cinchona with hydrochloric, or dilute sulphuric acid. — It the disease becomes chronic, a slight alterative course of mercury and of *sarsaparilla* generally proves beneficial. The solution of potash and the alkaline carbonates are also serviceable, when taken in tonic infusions. The local remedies, which were recommended in the other forms of the disease, namely, emollient fomentations and tepid ablutions, mild ointments applied to the excoriated surfaces, and sea bathing, or sulphureous fumigation on the decline of the eruption, will also be required in this variety.

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IMPOTENCE AND STERILITY. — SYN.

Impotentia Generandi, *Sterilitas*; *Ἀναφροδία*, *Anaphrodisia* (from *α*, neg., and *φροδία*, and that from *Ἀφροδία*, *Venus*), Auct. var. *Impuissance*, Fr. *Unvermögen zum Beischlaf*, *Unmüchigkeit*, Germ. *Impotentia*, Ital.

CLASSIF. — 1. Class; 1. Order (Cullen). 5. Class; 2. Order (Good). 1. CLASS, II. ORDER (Author).

1. DEFIN. — Incapacity of sexual intercourse, and inability of procreation.

2. *Impotence and Sterility* are so intimately related, that they must necessarily be considered under one head, although disjoined by Goon and some other nosologists. They are subjects of much greater practical importance than has been conceived by many, and often involve the happiness and perpetuation of families. Yet have they, by a sort of professional prudery, been either entirely overlooked by medical writers, or very imperfectly discussed, and thereby relinquished to the irregular practitioner, or to the entirely unqualified empiric. In the present era of high refinement, and of luxurious, if not vicious, enjoyments; and under the influence of noxious plans and systems of education; instances are very numerous, for which medical advice is required, for the removal of the morbidly disqualifying conditions about to be considered, but is not resorted to so frequently as it ought to be. Since a *habitus* is thus often necessary, the ability of those whom the community is so apt to neglect, is the most judicious kind, &c. Dr. B. is in providing it. There is every reason to believe, that it would be often sought after, if the subject were known to be more fully entertained by the duly qualified members of the profession. The practical consideration only of these morbid conditions falls within my plan: their legal relations are very ably discussed in the classical works of *PARRIS*, *BREA*, and *SARRIN*.

3. *Impotence* may exist in either sex, but most commonly in the male, owing to the sexual conformation. *Sterility* most frequently depends upon the female, although it sometimes is owing to the male; and, in a practical point of view, if not in a medico-legal one, it is more frequently thus owing, than is stated in books.

4. *Impotence and Sterility*, in respect of both sexes, have been differently arranged by writers; — into *absolute* and *relative*; *constitutional* and *local*; *direct* and *indirect*; *permanent* and *temporary*; and, by Dr. B. &c., into *absolute*, *curable*, and *accidental*. These distinctions are all of importance in the consideration of the subject; but the divisions founded on the nature of the causes are more useful. — M. RAIGL DELORME has ar-

cially of tobacco, hyoseyamus (MARC), ciueta, and opium. The sedative gases (FODERÉ), particularly carbonic acid gas, may produce it. Various refrigerants have a similar influence, as nitre, the carbonates of soda, camphor (DIEMI ABRONCK and LOSSIUS), and some cooling diuretics. The smell of camphor has long been considered as anaphrodisiac; and colchicum has certainly this effect, as noticed by DR. BEATTY. Soda water also exerts the same influence. The effect of these, however, are only temporary or partial. — Injuries of the spine or spinal cord, or of the head, particularly the occiput (MANICILLUS DONATUS, FABRICIUS HILDANUS, HENNEN); venæsection behind the ears (HIPPOCRATES); arteriotomy, &c.; have been considered causes of impotency. Of the influence of the first of these there can be no doubt. The use of mercury has been assigned as a cause, but it can hardly be viewed as such, unless carried to excess.

3d. *Org. lesions occasioning impotency.* are — (a) Diseases of the generative organ or of adjoining parts; — (b) Malformations of these organs; — and (c) Deficiency of one or more of them. — Anaphrodisia from the first of these is often only temporary or relative; but from the second and third, it is generally absolute and permanent. A. The diseases which most frequently cause impotency are — firstly, those of the penis; secondly, of the testes; and, thirdly, of adjoining parts. a. The penis may be so excessively irritated as to occasion a temporary impotency by obstructing the opening of the seminal ducts and the urethra. Much more frequently, however, complete or partial paralysis, or deficient energy of the nerves, and consequently of the muscular and vascular action of the organ, occurs, constituting the *anaphrodisia paralytica* of authors. This latter state is merely an aggravated form of functional impotency, and most commonly produced as above stated. An singular instance in which the cells of the corpora cavernosa were apparently disorganised or altered by inflammation and suppuration, so as to prevent the influx of blood, and consequent distention of the penis, and to occasion impotency, has been recorded by MR. CAGLEWAX. A similar change to this may take place in one side of the organ, and have nearly the same effect upon its functions.

10. Various obstructions to the seminal discharge occasion temporary or permanent impotency. The chief of these are strictures of the urethra, and disease of the seminal ducts. FODERÉ (*Med. Leg.* lib. i. p. 382.) adduces two cases, in which the powers of copulation existed, but without the seminal discharge. In one, the ducts were obstructed by hard concretions; in the other, they were constricted and callous. As stated by DR. BEATTY, the opening of the conjoined ducts of the vasaules seminales and vasa deferentia may be closed by scirrhus enlargement of the neck of the bladder, by enlargement of the prostate gland, by scirrhus of the verumontanum, or by lesions of the duct itself. Strictures of the urethra can hardly be considered a cause of impotency, unless they are so extreme as not to permit the passage of a fine bougie. In the states of disease just mentioned, the inability of procreation arises from obstruction to the discharge of the seminal fluid, which is duly secreted; and when the obstruction is seated in the urethra, it may be removed by modern surgery. M. FODERÉ and DR. DENTON

state that double scrotal hernia, by pressing upon the spermatic cords, sometimes causes as complete emasculation, as if the testes were entirely removed.

11. b. Impotency may also depend upon organic lesions of the testes — upon scirbus, calcinoma, fungoid disease, or scrophula of these organs. But unless the whole structure of both organs be changed, the faculty of procreation may not be entirely or permanently lost. Uncommon smallness of these organs may occasion only temporary impotency; for this state may depend upon delayed evolution, or arise from the wasting consequent upon disease. MR. WILSON mentions the case of a person, twenty-six years of age, in whom the penis and testes remained of the same size as in childhood. He married at this age, and at twenty-eight, the organs had reached their natural size. When, with smallness, there are remarkable flaccidity and softness conjoined, impotency is much more complete and even permanent. In a case of this kind in a strong young man, ... and, my case, no benefit resulted from treatment. Severe bruises of the testes may be followed by wasting or disorganisation of them. DR. J. G. SMITH alludes to this mode of making cunuchs, and states that it sometimes failed. I believe that most of the instances in which impotency has been said to have been produced by riding, have been owing to bruises or injury of these organs, or to the pressure to which they have often been subjected. Wasting of the testes may, however, arise without any very obvious cause. In the extreme case in

I was consulted, I was unable to ascertain its source. It occurred in a most robust and muscular young man, who would not admit that he had had recourse to excessive or vicious indulgence, or that he had been unusually continent, until his inclination ceased with the decay of the organs. FODERÉ states that it was a common disease among the labourers in the canal of Atles; and LARONIE, that it was not uncommon among the French troops on their return from Egypt. It has also been observed as a consequence of the metallic venereal disease applied to the testes. — Induration of the testes independently of scirrhus disorganises them, and is great as to destroy their functions. According to M. AUBERT, the semiferous tube are entirely obliterated, and the structure of the organ is hard, homogeneous, and without trace of organisation in cases of extreme induration. Impotency from inflammation of the testes is only temporary.

12. c. The lesions of adjoining parts occasioning impotency, are chiefly, uncommon obesity, very large scrotal hernia, and hydrocele. Neither of them requires any mark. A varicose state of the spermatic veins may also have this effect, when it is very remarkable. But I am unacquainted with cases in which this cause has been assigned.

13. B. Malformations of the male genitalia may occasion impotency. Great size of the penis is seldom, and smallness of the organ is, perhaps, never a cause of it, if the functions of the testes are duly performed. According to ZACCINAS, FODERÉ, BEATTY, and others, excessive size, particularly excess in length, may produce relative or temporary impotency, by injuring the female organ. The chief malformations of the penis having this effect absolutely or permanently, are those in which the urethra terminates in the pe-

rinum; and even in these, impregnation may be accomplished by art. JOHN HUNTER was consulted in a case of this description, and was induced, by the experiments of SPALLANZANI, to recommend the patient to collect the seminal fluid emitted from the perineum during intercourse, and to inject it into the vagina. Impregnation took place, and a healthy child was born in nine months.

13. In cases where the urethra opens in a part of the penis admitting of being introduced within the vagina, impotency may exist, but it is only relative; for procreation may be effected when the opening is thus situated, whether it be on the dorsum (*epispadias*), or on the inferior surface (*hypospadias*), as more frequently observed. Numerous instances are recorded by SIMMONS, BELLOC, KOPP, BLONDELLI, and L'ORRE, of impregnation by persons in whom these malformations existed. Mr. J. HUNTER met with a case, in which the epididymis terminated in a cul-de-sac, instead of passing to a vas deferens. Dr. BEATTY states, that a similar conformation sometimes exists in the vesiculae seminales, where, instead of entering the urethra, they terminate, after being joined by the vasa deferentia in shut sacs. When these formations of the excretory ducts of the testes exist on both sides, absolute impotency necessarily results, but they are extremely rare.

14. *C. Deficiency of one or more of the male organs* occasions absolute or relative impotency.

a. Congenital deficiency of the penis is rarely observed, and complete deficiency, still more rarely. Mr. FODERÉ mentions a case in which no vestige of the organ existed from birth. The testes were perfect, and sexual desire was not impaired. In most of the instances of congenital partial deficiency or malformation of the penis, recorded by authors, the urinary organs presented other malformations, particularly in respect of the urinary bladder and ureters. This is illustrated by several cases in Dr. DUNCAN'S Memoir on this subject. (*Edin. Med. and Surg. Jour.* vol. xxv. p. 31.). *Accidental* deficiency of the penis is sometimes met with. The organ may have been either amputated or diseased. In the former case, a surgeon, who was sent for in great haste,

found the patient in a state of syncope from hemorrhage, proceeding from a very recent amputation of the penis close to the pubis. The strictest secrecy was preserved as to the cause and mode of amputation, which had evidently been effected by a sharp instrument.

15. The glans penis, and indeed the greater part of the organ, may be lost without causing more than relative impotency; and possibly, nearly all of it may be removed without producing an absolute loss of the procreative faculty, if the means resorted to by JOHN HUNTER (§ 12.) be employed. Instances of extensive mutilation of this organ, without destroying this power, are referred to by FRANK, PEARL, BEATTY, and others; and although there is every reason to conclude, that a complete removal of the penis will generally occasion impotency, yet the proper function of this part being to excite the female organs, and to convey the prolific fluid to the parts destined to receive it, if these purposes can be at all accomplished, impregnation may follow.

16. *b. Congenital deficiency of the testes* is rarely observed; and most of the cases in which these organs have been said to have been wanting, are

merely instances of their retention in the abdomen. When they are not found in the scrotum, their entire absence can be inferred only from the history of the case, and from the state and appearances of the patient; for when they are altogether wanting, the usual characters of the male are partially lost, and those of the female assumed. As delay in the descent of the testes may arise from some imperfection, or delay of development, as J. HUNTER reasonably infers, certain of the female characters may be presented, and yet these organs may exist nevertheless. The question then is, whether or not, the state of development, to which they may have attained, is sufficient for procreation. M. MARC adduces the case of a person of a feminine appearance, who yet possessed the full procreative power. The external characters cannot therefore always be confided in; but when all the external appearances of virility are present, although the testes are not found in the scrotum, there is every reason to infer that impotency does not exist; for numerous instances are on record proving that the mere retention of these organs within the abdominal ring does not affect the procreative power.

17. The congenital absence, destruction, or removal, of one testis is not a cause of impotency. It may however be a cause of relative incompetency and even of complete impotency, if the remaining one be soft, small, or withered. Castration, or the removal of both testes is followed by complete and permanent impotency, if it have been performed before puberty. But, subsequently to this period, the power of procreation may exist for a very short time after its performance, owing to the seminal fluid collected in the vesiculae seminales previously to the operation. M. MARC supposes that the time taken for the cure of the wound is sufficient for the absorption of this fluid into the circulation; but the cases adduced by M. BOYER and Sir A. COOPER prove that a temporary power exists or is returned until the vesiculae seminales are emptied. On this subject, the works of PARIS and BERG will be consulted with advantage, for it hardly comes within the scope of this work.

18. *II. IMPOTENCE AND STERILITY IN THE FEMALE.* A female may be impotent but not sterile, and she may be sterile, but not impotent; for, as respects the former condition, a state of the sexual organs may exist sufficient to prevent intercourse, and yet, upon its removal, impregnation may take place; and, as regards the latter condition, perfect competency to intercourse may exist, and yet conception may never occur. She may also be both impotent and sterile, or, in other words, were the impediment to due intercourse entirely removed, impregnation might not be effected. Sterility is very much more common than impotency in the female, and even than impotency in the male.

19. *A. The causes of IMPOTENCE in the female* are an impervious state of the vagina, absence of this canal, remarkable constrictions of it, the division of it by a septum running downwards from a double uterus, adhesions of the sides of the vagina, or of the labia, and the termination of the passage abruptly in a cul-de-sac. An impervious vagina may arise from changes in the soft parts, consequent upon protracted inflammation or irritation, the passage becoming first constricted or remarkably contracted, and ultimately obliterated. In a case respecting which I was consulted, a recto-vaginal fistula, seated at the upper part of the va-

gina, had occasioned so remarkable a contraction of the vagina, that its canal was almost obliterated, its parietes having become callous and indurated. A similar result may also follow a vesico-vaginal fistula. FODERÉ believes, that malformations of the bones of the pelvis may be so great as to prevent intercourse, but this can hardly be the case. Exostoses, however, on the internal or inferior surface of the bones of the pubis may have this effect, but their occurrence in this situation, and to this extent, must be very rare. Congenital absence of the vagina has been met with by VILVIME, MOULON, SYME, and WARREN; and absence of both vagina and uterus by MOIT, DAVIS, MACFARLANE, and others. In a case adduced by FODERÉ, the uterus and vagina were found, upon dissection, to constitute one solid mass, without any cavity in either. In a child, examined after death by HUFFLAND, no trace of genital organs, peculiar to either sex, was found, externally or internally. Although such instances are rare, there is no doubt that one or more of the different parts forming the female organs may be wanting. Congenital narrowness of this passage has been observed in a very few instances. In one or two of these, however, impregnation occurred, and the passage became enlarged in the progress of gestation. Contraction of the vagina was said to have existed in the celebrated Joan of Arc. The division of the canal by a septum has been met with in a very few cases only. Firm adhesions of the labia pudendi are not uncommon in children, in consequence of neglected excoriation or inflammation. I have seen several instances of these adhesions of various extent, duration, and firmness. They are more rare in females after the age of puberty, but they have been met with at this age by BENVOIT, MERRIMAN, RYAN, TUCKER, and others, and in some cases, they have been so complete, as nearly to prevent micturition. Inflammation or injuries, by instrument, or otherwise, during parturition, have been followed by adhesion of the sides of the vagina, and total obliteration of the canal. Several of the instances of obstruction by a strong membrane placed at the commencement, or in some part of the passage, recorded by FABRICIUS HILDEBRAND, RUYSEN, AMBROSE PARÉ, BENVOIT, FODERÉ, PHYSICK, and others, may be imputed to adhesions long previously formed, which have subsequently assumed an organized and membranous state, rather than to an inordinately firm and resistant hymen. The hymen may, however, be thickened and hypertrophied, and be a cause of impotence by preventing intercourse. Yet impregnation may be effected nevertheless, as proved by numerous cases. This state of the membrane is therefore not productive of absolute impotence, even should it be allowed to continue; and it is not a permanent cause, as it may always be removed by an operation. Complete prolapsus or procidentia of the uterus, retroversion of the uterus, prolapsus of the vagina, cancer of the vagina or uterus, and extreme brevity of the vagina, are generally productive of impotency, although impregnation has occurred in rare instances, notwithstanding these lesions.

20. B. STERILITY may proceed from absence of the uterus, or of the ovaria, or of both. When the uterus is wanting, the vagina is usually short. It may also proceed from a scirrhus or indurated state of this organ, from tumours in its substance, from polypi in its cavity, or attached to its neck,

from occlusion of the Fallopian tubes, or adhesion of their fimbriated extremities to adjoining parts, from narrowness or entire obstruction of the os uteri, and from disease of both ovaria. Several of these require further remark. Extreme constriction of the os uteri has been shown by DR. MACINTOSH to be productive of difficult, painful, or obstructed menstruation, and it most probably is also one of the causes of sterility. The mouth of the uterus may be completely obstructed by agglutination of its sides, or by a false membrane stretched across it, either internally or externally. The openings of the Fallopian tubes may be also closed by a membranous production, or by an albuminous exudation from the internal surface of the uterus. The tubes may be either partially or altogether obliterated, in consequence of the extension of inflammatory action to them, from the uterus or adjoining parts. When these alterations extend to both tubes, sterility must necessarily result. Although tumours developed in the body or neck of the uterus, and polypi attached to its internal surface, generally prevent impregnation, yet instances have occurred, in which conception has nevertheless taken place. These are however, very rare, and abortion has always occurred during the early months. A tumour or polypus may be formed on the internal surface of the uterus, and yet after its removal, the patient may conceive and bear a child at the full time. A case illustrative of this has been recorded by DR. BAILEY.

21. The above causes are mostly productive of absolute or permanent sterility, but there are others, which are either relative, or admit of removal. These are chiefly, too profuse, or too frequent, and difficult menstruation, constant or profuse leucorrhœa, inflammatory affections of the uterus, or of its appendages, dislike, disgust, and indifference on the part of the female, &c. Profuse or frequent menstruation is a more common cause of sterility than is generally supposed in this state, particularly when associated with relaxation of, or increased vascular determination in the womb, preventing the retention of the eggs until it has undergone the changes necessary for attachment to the uterus. It is a probable cause of sterility chiefly when it depends on inflammatory irritation of the internal surface of the uterus, or when the secretion proceeds from relaxation of the vessels in this situation. When it is a consequence of inflammatory action, sterility may continue after the discharge has ceased, owing to organic changes in the surface of the uterus, or in the Fallopian tubes, especially the formation of a false membrane in the former, and the production of an albuminous exudation in the canals of the latter, or consequent obliteration of them. When barrenness depends upon leucorrhœa proceeding from local relaxation, or general debility, it may be removed upon the disappearance of its cause. Delayed, retained, obstructed, or suppressed menstruation frequently occasions sterility. Some females have, however, conceived, who have never menstruated; and the mere suppression or obstruction of the catamenia may or may not prevent impregnation; various other contingent changes, or concurring circumstances, either favouring or preventing this result. Difficult menstruation is sometimes a cause of sterility, but its influence also will depend much upon other circumstances. That form, however, of dysmenorrhœa, described

by Dr. DUNCAN and Dr. DEWEES, which appears to depend upon the formation of a membranous substance in the uterus, having a strong resemblance to the decidua, is very generally productive of barrenness; but this is only one of the several forms which subacute or chronic inflammation of the uterus assumes, either of which may occasion temporary or permanent sterility.

22. There are other causes of temporary or relative sterility. Among these the most common is too frequent, yet inefficient sexual intercourse, too early marriages, general ill-health, and debility or exhaustion of the female organs, owing to premature or too frequent excitement. Various circumstances connected with sterility in prostitutes have, perhaps, thrown some light upon certain of the causes of this state; and particularly the fact, that many of this class have had children after marriage, or after relinquishing promiscuous intercourse. Numerous instances have occurred of females who, having been obliged to marry contrary to their inclinations, have not conceived, and yet have had children from a second marriage. It is generally understood by females of all ranks in society, that indifference during intercourse, or suppression of the orgasm will prevent impregnation; and, although they are sometimes deceived in this respect, yet their inference is correct in the majority. This is one of the principal causes of the sterility of prostitutes, other circumstances, however, besides those just alluded to, combining with it, to produce this effect in them.

23. III. TREATMENT. The treatment of impotence and sterility depends entirely upon the causes of either the one or the other, as far as they can be known. Many of these causes may be fully ascertained, and the consequences correctly anticipated; but as to the existence of others, inferences only can be drawn from a number of circumstances, and these inferences cannot be always fully confided in. Most of the organic lesions and deficiencies, enumerated above, cannot be removed, yet a few of them may be assisted by art, temporarily or permanently. But many of the functional and morbid states, and their effects, may be removed. Absence of an organ, or the imperfect function of generation in either sex, is generally productive of impotence and sterility. Yet an imperfection only, and disease, of one or more of these organs occasioning either inability in the male or barrenness in the female, may be remedied. Adhesions of the prepuce to the glans penis, phimosis, strictures of the urethra, fistulous openings in the course of the urethra, some of the diseases of adjoining parts that prevent intercourse, paralytic and debilitated states of the penis, and the slighter injuries of the testes, may be permanently removed, and their consequences disappear. Contractions of the vagina, and even constriction or narrowness of the os uteri, occlusion of the entrance of the vagina by adhesions of the labia, or by a morbidly dense hymen; or by a false membrane, prolapsus or proeidentia of the uterus or vagina, uterine polypi, leucorrhæa, difficult or painful menstruation, and inflammatory states of the uterus may be severally remedied, and, although sterility may not be always, it will be frequently, also removed.

24. Cases of impotence and sterility from moral and functional causes are the most common; and, although they require the most scientific and judi-

cious treatment, yet the mental, as well as the physical imbecility, that often characterises them, brings them more frequently in the hands of pretenders and empirics, than in those of the qualified practitioner. The cases which proceed from these causes may be arranged into 1st. Those which depend upon exhaustion; 2d. Those which proceed from disuse, or from an imperfect exertion, of the function; and, 3d. Those which arise from excessive mental and physical excitement, relatively to the susceptibility and sensibility of the nervous system.—a. When impotency and sterility proceed from exhaustion, or from a premature decay of the generative functions, owing to premature, unnatural, or excessive excitement, the treatment is nearly the same in both sexes, according as either may be chiefly or solely affected. In these cases the indications are, to restore.—1st. The energies of the constitution; and 2d. The functions of the procreative organs. To attempt the second, without either previously or contemporaneously fulfilling the first indication, will generally be futile, and often injurious. Persons, who are thus exhausted, sometimes perpetuate their infirmity by having recourse to noxious excitants, and to the means advised by empirics. The scientific practitioner will be guided in the selection of remedies, by the causes, circumstances, and phenomena, connected with the case; and he will find it necessary to associate a moral or mental regimen with the physical means which may be required. When the affection depends upon an excited imagination, in connection with a depraved habit, the former part of the treatment is the most necessary, but the most unpleasant for the physician to prescribe, and the most difficult for the patient to adopt. In these cases the mental weakness has advanced, *pari passu*, with the constitutional and local infirmity, until the mind has become incapable of exerting its more reflecting and moral powers. It is therefore, be often necessary to restore the energy of the nervous system by suitable diet, appropriate medicines, regimen, occupation, and change of air, before the moral part of the treatment will receive due attention from the patient.

25. In other and slighter cases, the debility is principally local, the general health as well as the mental energies, remaining only partially or but little impaired. In these, the local, constitutional, and moral means of cure, will frequently prove successful, especially in the male. In this sex, when the inability depends chiefly upon weakness of the sexual muscles, invigorating modes of treatment, general and local, usually remove it, if its causes be avoided. In all these, attention to the digestive and secreting functions, vegetable or mineral tonics, especially the preparations of iron, and chalybeate mineral waters, the shower bath, or the cold salt-water bath with regular exercise in the open air, mental occupation, and early hours, will generally be most beneficial. Where the patient is subject to discharges from the urethra upon passing a stool, or on the excitement of sexual desire, a turgid and irritable state of the prostate gland may be inferred. When he is liable to frequent emissions during sleep, an irritable condition of the testes, and of the *vesicula seminales* obviously exists. In these, the more cooling tonics and the more astringent chalybeates may be employed, particularly the mine-

ral acids, alone or with bitter infusions, and the tincture of the muriate of iron, aided by the regimen already stated. When the general and local asthenia are great, a moderate use of wine, of warm spices and aromatics, with as full and nutritious diet as the digestive organs can dispose of, will also be requisite. But the mental and local causes of sexual excitement should be avoided, so that the function should not be exerted beyond what may be necessary to restore and to fortify it.

26. When impotence in the male depends upon a too frequent exertion of the sexual function, the means of cure are sufficiently obvious. Yet the patient may be unable, from mental or nervous weakness, to exert the control necessary for its cure. In such a case the usual restorative remedies should be prescribed, especially chalybeates and cold sea-water bathing. In most of these, the male organs are so irritable, that their functions are performed too rapidly and imperfectly, or before the organs, more or less necessary to procreation, can be excited in the female. At the same time, the male secretions are inadequate, particularly in respect of elaboration and retention in the *vesiculae seminales*, for the accomplishment of the purpose for which they are intended. This form of male impotence and sterility is commonly produced by masturbation, and is most benefited by whatever will improve the general health, and restore the tone of the sexual organs. Attempts at intercourse in these cases should not be more frequently than may strengthen or promote the function, without exhausting or weakening it.

27. The other states (§ 7, 8.) of functional impotence and sterility above alluded to, hardly require a particular notice, as they are temporary only, and soon disappear, as circumstances generally arise which soon remove their causes. It is, indeed, chiefly to the removal of the causes, that the attention of the physician should be directed, in the treatment of this complaint in both sexes.

28. In ancient times, and recently in some countries, both civilised and savage, the removal of impotency and sterility by the use of heating substances, supposed to possess aphrodisiac properties, was generally attempted. The prematurely aged, worn out debauchees, and the community generally, in some parts, especially in China, Japan, Africa, &c., often employ substances which are reputed to possess these properties. But the effects they produce, when they produce any, are more commonly injurious than beneficial. Musk, ambergris, cantharides, phosphorus, opium, the hot spices, aromatics, coffee, vanilla, borax, ginseng, castor, saffron, &c., are supposed to possess aphrodisiac virtues; and a diet consisting principally of fish or of shell-fish, has a similar repute. Circumstances may arise in which it may be proper to prescribe certain of these, as possessing stimulating and restorative properties; but others of them ought to be employed with extreme caution, particularly cantharides, phosphorus, and borax. The nostrums said to possess the virtues in question ought not to be resorted to. Certain articles of food, as pigeons, eggs, particularly raw or undressed eggs, caviare, herrings recently pickled, oysters, truffles, &c., may be employed, as being at least harmless; but the less that heating medicines are prescribed the better, unless under certain circumstances, which may occur to require them; as in cases where the sexual func-

tion has not been restored after exhausting and depressing diseases, or after prolonged exertion of the mind on abstract subjects. I have recently consulted by a gentleman about forty, who had no return of the sexual function after a severe attack of influenza a twelvemonth before. He had perfectly recovered from it in other respects for several months, and the remaining imperfection was a source of distress to him. In a case of this kind, the physician should at least know the means most likely to be of service, particularly inability may become a matter of family trouble, as well as of individual misery. KEMPER states, that a combination of musk, ambergris, opium, and aromatics, in the form of small pills, are much employed by the Chinese and Japanese as an aphrodisiac; and I believe that it is not without some degree of efficacy. But it is very obvious, that the prolonged or too frequent recourse to these and similar substances is most injurious, both morally and physically.

29. The sterility of females must be treated with strict reference to the causes, as far as they may be ascertained or inferred. When it is chiefly functional, and induced by exhaustion, or by the noxious practices already alluded to, the means of cure are very nearly the same as have been here recommended, especially attention to the digestive and uterine functions, the use of chalybeates, or of chalybeate or other tonic mineral springs, with air, exercise, and early hours. For them also, the cold salt-water bath, the shower bath, or the salt-water douche on the loins, will also be of great service. The importance of a due regulation of the mind, of healthy occupations, and of abstinence, should be duly estimated.

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INDIGESTION. — SYN. *Δυσπεψία* (from *δύς*, with difficulty, and *πείρω*, I digest), *βραδύπνψία*, *απείψια*, Gr. *Concursio tarda*, *Stomachi resolutio*, *Cruditas*, *Indigestio*, *Passio Stomachica*, Auct. et. *Apepsia*, Vogel. *Soda*, Linnæus. *Anorexia*, var. *Bradypepsia*, Sauvages. *Dyspepsia*, Cullen. *Par. dyspepsia simplex*, *Timosis*, *Indigestio*, Good. *Schwere Verdauung*, Germ. *Indigestione*, Ital. *Bad digestion*, Eng. *Indigestion*, &c.

CLASSIF. — 2. Class, Nervous Diseases; 2. Order, Defect of Vital Energy (Cullen). 1. Class, Diseases of the Digestive Function; 1. Order, Affecting the Alimentary Canal (Good). I. CLASS, I. ORDER (Author, in Preface).

1. DEFIN. — Impaired or fastidious appetite; slow and difficult digestion; sensations of discomfort referable to the stomach, and frequently costiveness.

2. *Dyspepsia* or *indigestion* has been employed as the generic designation of several disorders ranged under it as species, by most modern writers, and particularly by SAUVAGES and CULLEN. YOUNG and GOOD have limited the meaning of the term, by considering some of those disorders as altogether distinct from it. Dr. TODD, however, in an able and comprehensive article on the subject, has applied this term to all the functional disorders of the alimentary canal. Having discussed several of the affections viewed by some writers as species of indigestion, in separate articles, according to their natures and seats (see articles, CÆCUM, COLON, COSTIVENESS, DUODE-

NUM, FLATULENCY, PYROBIS, STOMACH, Painful affections, and inflammation of), my observations, at this place, will necessarily be confined to the simpler forms of this disorder.

3. *Indigestion* is either primary or secondary, — idiopathic or symptomatic, simple or complicated. When it is complicated, it may have been either the primary or the secondary affection. Dr. TODD distinguishes between symptomatic and sympathetic dyspepsia; and remarks that, "a secondary dyspepsia may be conveniently divided into symptomatic, forming only a part of a more general disease, and sympathetic, the consequence of consent with the disorder of some other organ." The distinction is, in some respects, wanting in precision, but it may be preserved as being one usually recognised.

4. The varieties or forms of indigestion have been variously described, named, and arranged, by the numerous recent writers on this disorder; and a most eager disposition has been evinced by all, to assign new terms, and to devise distinct pathological states, for each. In some instances, distinctions have been multiplied to an extent bewildering the inexperienced, and beyond the actual morbid manifestations of the organs affected. It will be readily admitted, that different forms of indigestion will depend upon different states of the stomach, and of its associated viscera; that, in one, the organic sensibility will be especially affected; in another, the secretions; in a third, the muscular contractility; in a fourth, the circulation; in a fifth, two or all of these functions; and that these particular affections will be variously associated with disorders of the liver, or of the pancreas, or of the duodenum, and not merely with these, but with others in remote organs. Yet these individual affections, even in their simpler or less complicated states, will seldom be manifested by symptoms enabling the most close observer to determine, with precision, which of them is the one actually present, either in a simple or predominant form, or the exact associations to which it may have given rise. It will, therefore, be proper not to multiply distinctions beyond those which will be found useful for practical purposes. The disorder which proceeds from a simple diminution of the functions of the stomach, — from impaired secretion, weakened organic contractility, and languid circulation — from asthenia of the organ, — will, with propriety, form one variety of indigestion; and that which depends upon a state of erethism, or vascular irritation, approaching, but not amounting to, inflammation of the villous surface, will constitute another. This latter, especially, will present certain modes, according as the sensibility, the villous membrane, or the follicular apparatus, is prominently affected. Those states of disease which are generally consequent upon dyspepsia, although sometimes appearing independently of it, and which have been classed by some writers as severer forms of this complaint, will be found under the heads referred to above.

5. I. DESCRIPTION. — I. SIMPLE ASTHENIC DYSPEPSIA; — *Stomachi Resolutio*, CELSUS, — *Frigiditas Stomachi*, PROSPER ALPINUS, — *Dyspepsia Idiopathica*, CULLEN, — *First Stage of Indigestion*, W. PHILIP, — *Atonic Gastric Dyspepsia*, T. J. TODD, — *Dyspepsia per Asthenia de l'Estomac*, ANDRAL, — *Dyspepsia Apyrétique As-*

thénique, Broussais; — is characterised chiefly by a sense of distention of the stomach, by acid or acid eructations, and flatulence, soon after a meal; by loss of appetite, or loathing of food, and occasionally by nausea. These symptoms, however, vary with the nature and quantity of the food. Heartburn, nidorous or putrescent eructations, and a feeling of weight or oppression at the epigastrium, are generally present after a very full meal, particularly of fat, oily, or rich meats. The tongue is pale, flabby, whitish, slimy or coated, and often indented by the teeth; the bowels are costive, sometimes irregular; the urine is pale, copious, and occasionally deficient of urica, or contains albumen; the pulse is softer, weaker, and often slower than natural; the temperature is diminished, or irregularly distributed, the extremities being cold, and the surface pale, or flaccid; the eyes are languid, and the physical and mental powers deficient in vivacity and energy. The symptoms, however, vary much in grouping and intensity with the kind, quantity of the solid and fluid ingested, with the temperament and constitution, and with the manner in which associated viscera are sympathetically affected. In some cases, they are gradually and very slowly developed by the continued operation of the causes; in others, they are more rapidly or suddenly induced by errors in diet, or by other powerful circumstances.

6. A. The latter, or the more acute and sudden attacks of indigestion, are generally consequent upon some manifest cause, particularly an overloaded state of the stomach, — and is identical with the *cruditās* of the ancients, and the *embarras gastrique* of the French. — It may occur, however, from substances which disorder the organic sensibility of the viscus, or from other causes. When it proceeds from this source, the symptoms soon follow a full meal, or appear in the morning. The patient experiences various uneasy or even painful sensations, with oppression or weight at the epigastrium, and heart-burn. These often extend to the pharynx. The tongue becomes dry, clammy or loaded, and the taste is lost or perverted. Rancid, oily, indigested, or acid substances are eructated or brought off the stomach, without nausea or retching. There are generally headach and languor. If nausea and vomiting take place, the contents of the stomach are thrown up, either partially or altogether undigested, with a ropy phlegm. Where vomiting does not occur, a sense of irritation or constriction of the fauces and pharynx, with a copious secretion of a watery fluid, and pains in the stomach, are often present. The appetite is abolished, or savoury articles of food are only relished. When the fit of indigestion occurs during the night, the patient experiences frightful dreams, or the nightmare, or spasmodic twitchings of the limbs, or severe pains in the stomach or bowels, or awakens with severe headach. The pulse is weak, languid, or soft; the skin cool and moist, and the extremities cold. Frequently chills, horripilations, formications, or even slight shudders occur. Various sympathetic affections often attend this state of dyspepsia, particularly headach, as described in that article, impaired or indistinct vision; muscæ volitantes, noises in the ears, and dullness of hearing; disorder or impairment of the senses of taste and smell, palpitations, and

vertigo, colicky pains in the abdomen, costiveness, &c.

7. An attack of dyspepsia in an acute or sudden form seldom appears, unless from the causes just alluded to. But it may proceed, particularly in delicate persons or females, from other causes, as powerful mental impressions, long fasting, or deprivation of wonted stimuli. In such cases, vomitings, or even retchings, rarely occur; but nausea or disgust at food, giddiness, headach, faintness, sinking or pain at the epigastrium, costiveness, palor and coldness of the surface, and inactivity, with irritability of temper, with some of the other symptoms already noticed, are commonly complained of. — These acute attacks are liable to pass into the more confirmed or chronic state of the complaint, next to be described, particularly when they recur frequently, or are neglected.

8. B. The confirmed or chronic form of dyspepsia may take place gradually or slowly, or as a consequence of the foregoing. In the former case, it is almost imperceptible in its progress, but it generally commences with symptoms of general, as well as local, debility. All the physical and mental functions betray more or less inactivity. The sleep is disturbed or unrefreshing, sometimes heavy or prolonged. The appetite in the morning is impaired and capricious, savoury articles being chiefly relished, and a sense of soreness or relaxation in the throat is often complained of. A full meal is followed by heaviness, yawnings, stretchings, and an almost irresistible disposition to sleep, by sense of fullness, weight, flatulence, or by rancid or acid eructations, &c. As the disorder continues, the appetite is more impaired and more capricious. The bowels become costive or irregular; the discharges being scanty, offensive, discoloured, or more copious or frequent, and sometimes containing imperfectly digested portions of food. The biliary secretion is either insufficient or disordered. Perspirations are copious on exertion, often offensive, and quickly discolour the linen. Flatulence is troublesome, particularly when the stomach is empty, and the mouth is clammy, or the tongue loaded, and especially in the morning. The face becomes pale or unhealthy; the trunk occasionally enlarges about the trunk or the neck. Vertigo, loss of memory, lowness of spirits, apathy, indifference; and numerous associated and sympathetic disorders supervene, according as the asthenia of the stomach extends to the duodenum and intestinal canal, or to the secreting collatitious viscera. In many cases, the affection extends along the œsophagus to the pharynx and fauces, occasioning the slightest forms of angina, or simple relaxation of the uvula.

9. As dyspepsia becomes confirmed, various additional sympathetic affections appear. Indeed there is scarcely a viscus, that may not betray disorder. Irritation about the larynx, chronic cough, particularly in the morning; huskiness of the voice, or hoarseness; copious perspirations, and eruptions on the skin; dry and parched state of the hair, or morbid condition of the cuticle and of the nails; great sensibility of cold, and also of heat; are very commonly observed. Shortness of breath on slight exertion; palpitation of the heart; intermissions and irregularity of the pulse; and other sympathetic disorders about to be noticed, often also appear. This variety of indi-

gestion, when neglected, or when its causes continue in operation, sooner or later passes into one or other of the forms of the variety, next to be described.

10. ii. INDIGESTION WITH VASCULAR ERETHISM, — *Irritative Dyspepsia*; *Cardialgia Inflammatoria*, SAUVAGES, — *Gastrite Chronique*, BROUSSAIS, — *Second Stage of Indigestion*, W. PHILLIP, — *Inflammatory Gastric Dyspepsia*, T. J. TODD, — is characterised chiefly by slow and painful digestion, a sense of heat and discomfort at the epigastrium, increased by food and by pressure, with thirst, dryness of the mouth and fauces, redness of the edges and point of the tongue, whilst the middle and root are white, loaded, or furred; costiveness, high-coloured urine, partially increased temperature and dryness of the skin, and a more frequent and sharp pulse than natural. It offers several grades of severity and various modes, according to the exciting cause, the temperament of the patient, and to the manner in which the organic sensibility and contractility, the secretions and associated viscera, are individually implicated. It may appear suddenly in an acute form, when the cause has been active, or gradually and slowly, either primarily, or consecutively upon the variety already described.

11. a. In the *slighter states* of irritative dyspepsia, the appetite is often increased, occasionally ravenous, in some instances impaired; thirst is generally present, particularly in the evening. The extremities are often cold; but burning or heat of the soles of the feet and palms of the hand frequently occur, particularly in warm or temperate weather. The point and edges of the tongue are red, the papillae raised or excited, and the root more or less loaded; the bowels are confined, and the stools dry and scanty. The pulse is somewhat excited, especially in the evening, and rather sharp than hard or contracted. Headach, sometimes with slight redness of the conjunctiva and contraction of the pupils, heaviness, unsound sleep, unpleasant dreams, and a feeling of fatigue and lassitude upon waking, are usually present. The symptoms referred directly to the stomach, are often not more than a consequence of the preceding variety; and on pressure, is not more than a complaint of. As the complaint, however, becomes more chronic, a burning pain is felt at the stomach, and is increased by a full meal and by pressure. Great discomfort and a sense of a load are referred to the region of this organ. Fulness or distension at the epigastrium, often extending to one or both hypochondria, is usually present. When heartburn occurs, it is characterised by a sense of heat or burning, and attended by redness and soreness of the fauces and pharynx. The tongue and throat are frequently dry, and the voice soon becomes husky on speaking, or on exerting it. Small vesications occasionally appear on the sides and points of the tongue, and more rarely excoriations on the fauces. In protracted cases, the tongue is often smooth, sometimes slightly fissured or chapped, or lobulated, or even glossy. Pain is felt in the left shoulder, or in the left hypochondrium, extending to the shoulder blade, or between the scapulae, and beneath the sternum. Severe headach; irritability of temper; depression of spirits; impaired appetite; palpitations; a harsh, dry state of the skin, frequently with scaly eruptions; occa-

sional bursts of perspirations during sleep; inability to lie on the left side; burning heat in the palms of the hands and soles of the feet; increased acuteness of the senses, or obscuration of certain of them; and a morbid state of all the excretions, severally appear, and often divert the patient's and practitioner's attention from the source of disorder. In some cases pain, often increased by flatulence, shoots through the hypochondria and chest, and a symptomatic cough, with slight greyish expectoration in the morning, is excited, owing to nervous connection, and to the extension of irritation to the pharynx and top of the larynx. In these, pectoral disease is sometimes suspected; and inflammatory irritation of the larynx may be actually thereby occasioned.

12. b. In the more severe or acute attacks of this variety of indigestion, particularly when produced by hurtful or indigestible food, or stimulating liquors, there is a total and sudden loss of appetite, with nausea, retchings, or full vomiting, increased by, or instantly following, the ingestion of substances into the stomach. Occasionally, the contents of the organ are regurgitated without effort or nausea, but with pain or a sense of constriction at the epigastrium and hypochondria. The pulse, is at times, but little affected; at others, quick and sharp, and the skin is harsh and hot; but perspirations break out when free vomitings are induced. There is always thirst; pain, or a sense of burning, of scalding, or of soreness is generally felt in the stomach, and it often extends, in the course of the oesophagus, to the throat; giving rise to a similar symptomatic affection of this part, and of the larynx and chest, as just noticed (§ 11.). In rare instances, however, where the retchings and vomitings are frequent and severe, but little pain, and no tenderness in the epigastrium are present, or much less than the severity of the symptoms indicates. The copious discharge from the mucous follicles and exhalants of the villous coat in these cases, removes the congestion of vessels, or the morbid conditions productive of pain and tenderness in other cases. But the symptoms vary remarkably with the exciting cause, with the temperament and disposition of the patient, and with the previous disorder and existing state of the collatitious viscera.

13. c. In the aged, or in young persons of a phlegmatic temperament, and in cold or damp climates and seasons, irritative dyspepsia assumes a form which has been denominated *Anorexia pituitosa*, *Anorexia Catarrhalis*, *Catarrh of the Stomach*, &c. by various writers. Dr. TODD has called it *Follicular Gastric Dyspepsia*; and most probably it proceeds from an inordinate and morbid secretion from the follicles of the stomach, that irritates the organ; but he has improperly confounded it with *Pyrosis*, which it closely resembles. It is characterised by an aching pain, by gnawing, or by a sensation of cramp, weight and uneasiness, or soreness, felt chiefly in the morning, when the stomach is empty, by loss of appetite, nausea, and sometimes by vomiting of a ropy, transparent, glairy, and tasteless fluid. It is often complicated with, or consequent upon, severe catarrhal affections of aged or phlegmatic persons, and is not infrequent in rheumatic constitutions, after errors in diet, and the use of indigestible, rich, or incongruous articles of food or drink. In this case, it usually occurs in the night and fol-

lowing morning. Along with indigested substances, a very large quantity of this colourless glairy matter is thrown up, and often continues to be ejected for a considerable time afterwards. M. ANDRAL has seen it thrown off in very large quantities, independently of the irritation of offending matters; but these matters are more commonly concerned in keeping up the morbid secretion. In most of the cases I have seen, the pulse was soft, languid, sometimes sharp during the attack, which was attended by a foul, loaded, or sodden state of the tongue, a warm perspirable surface, or free perspiration, much depression of nervous power, and constipation; but there was little or no thirst, nor tenderness or increase of pain on moderate pressure of the region of the stomach. Flatulence, eructations of an insipid or slightly acid fluid, a copious flow of saliva from the mouth, or of a watery fluid from the pharynx, and oppression or distention of the stomach, although pain is much abated, after eating, generally accompany the disorder. This form of irritative dyspepsia is often preceded or attended by severe catarrhs, by dyspnoea, or humoral asthma, or by rheumatic affections; and it is most common in cold and wet seasons, when these are prevalent. In its slighter or less acute states, or when appearing independently of over-distention or irritation of the stomach by bulky or indigestible substances, the pulse is usually slow or soft, the extremities cold, the evacuations scanty or mucous, and the tongue white, sodden, or loaded. As Dr. TOWN remarks, there is a frequent desire to take food, with thirst, and, as the disease continues, there is wasting of the flesh. The uneasiness caused by the laborious digestion subsides as the process is finished, but before the time of taking food arrives, the stomach becomes irritated by its own secretion, which produces all the inconvenience of a foreign indigestible substance in that organ; such as a sense of sinking, of dragging, of nausea, faintness, gnawing, or erosion, which are again, for a time, relieved by the taking of food. (See art. PYROSIS.)

14. *Indigestion of certain symptoms of indigestion.* — A. *Cardialgia*, or *Heartburn*, presents itself in two forms, each of which assumes various grades of severity. It is generally attended by acid or acrid eructations, exciting irritation in the throat and fauces. The acidity of the eructated matters is often remarkable, occasioning the most unpleasant sensations in the mouth and pharynx, with a copious flow of fluid from those parts. The matters brought up from the stomach are sometimes rancid and alkaline, particularly after a full meal of rich or fat animal food. In this case, a feeling of disgust is excited on each eructation, and large quantities are thus thrown off, or regurgitated from the stomach, without either nausea or retching. In either form, unpleasant gnawing, burning pain, and tenderness, are felt at the epigastrium, with distention, extending to the hypochondria, and with tightness or oppression in the chest. *Cardialgia* chiefly occurs during the period of digestion, but sometimes not until an advanced stage of the process. It may be mild, and consist simply of uneasy sensation, gnawing, or burning at the cardia, sometimes with slight faintness or flatulence; or it may be severe, the uneasiness extending over the region of the stomach, attended by depression, anxiety of countenance, and faintness. This latter state has been denominated *sinking heartburn*. It is only when *cardialgia* is severe, that it is ac-

companied with frequent and copious, rancid, alkaline or septic eructations.

15. *B. Of the Evacuations, &c.* — a. The stools furnish comparatively little information in dyspeptic ailments, when only those procured by an active purgative are examined. They are most commonly scanty, dry, and deficient in healthy odour and colour, especially in the asthenic and simple states of the complaint. In the irritative states, the discoloration is often greater, and they are occasionally mucous or watery, particularly when irritation extends along the alimentary canal. But in either variety, they vary remarkably in colour, consistence, and character; being either dry, pulsatious, slimy, scybalous, mucous, bilious, clayey, whitish, or yeasty, and sometimes presenting several of these appearances at the same time. The calls to evacuation are commonly rare or delayed, but they are occasionally frequent and inefficient. It is chiefly when torpid or disordered function of the liver, duodenum, or intestinal canal, is associated with indigestion, that the states of the evacuations described by Dr. W. PEARSE are met with; for these states, as Dr. J. JONES justly contends, are not common in the simpler forms of the complaint. "The alvine discharge," the former writer remarks, "sometimes chiefly consists of bile; its colour at other times is too light, more frequently too dark, and occasionally almost black; at different times it assumes various hues, inclining to green or to blue; and sometimes it is mixed with, and now and then almost wholly consists of, undigested bits of food." When there is much straining, it often contains mucus, sometimes in distinct masses, or substances resembling bits of membrane. "It frequently separates from the canal with more difficulty than usual, and leaves a feeling of the bowels not having been completely emptied."

16. *b. The urine of a person in good health is perfectly clear and limpid when passed, and continues so for some time after it cools, being more or less deep in colour, according as its ingredients are concentrated or diluted. But it has been satisfactorily shown, that when acidity is prevalent in the stomach and alimentary canal, or when the usual acid secretion of liver is diminished, when pressed, the urine, after standing, deposits a reddish substance, which is the uric acid, or a coating of lithic acid, the supernatant fluid still remaining clear; but when an opposite condition to this exists in the digestive organs, the contents of the stomach being alkaline or devoid of their proper acidity, and when the function of the skin is unusually excited, the urine becomes turbid, and a whitish, or purulent white, sediment is observed, consisting of lithate of ammonia, or of an amorphous deposit of phosphates and lithates. If irritation or inflammatory affection of the stomach is present, this fluid is scanty and high-coloured. In irritability of the organ, it is often pale, limpid, and very copious. In several states of indigestion, it occasions smarting in its passage, owing to the unusual abundance of urea. Dr. PROVER observes, that in one or two cases of obstinate dyspepsia, he has seen the urine not only pass of a bright pink colour, but remain so on cooling, without depositing any sediment; and he considers this pink colour to proceed from the large quantity of purpurate of ammonia present, which, from there being no lithate of ammonia with which it might be combined, was necessarily held in solution.*

17. *c. Pain and tenderness at the epigastrium* and region of the stomach have been much insisted upon by Dr. W. PHILIP, as indicative of the more inflammatory states of dyspepsia. But as I have shown elsewhere (see STROVEN — *Morbid Sensibility of*), the most severe pains in this organ are often felt without any inflammatory disposition. Tenderness upon pressure is a very common symptom in the slight or more functional states of indigestion, as well as in the severe or more inflammatory, especially in thin and delicate persons. It is seldom wanting in irritative dyspepsia. The tenderness is often connected with *fullness* in this region, and also in the hypochondria. But this latter symptom is generally owing to the distention caused by flatus, and by feculent and flatulent collections in the colon. When emaciation takes place in protracted cases, the fulness becomes more apparent.

18. *d. The pulse*, in dyspepsia, is extremely various, but it is most commonly as I have described it. During the digestion of a full meal, it is usually accelerated, and somewhat harder⁴ or sharper than usual. The hardness insisted on by Dr. W. PHILIP, as indicative of the passage of functional into inflammatory dyspepsia, is seldom present. Sharpness and quickness are more frequently observed, and are symptoms of irritation rather than of inflammation. The febrile symptoms occasionally occurring, with soreness of the throat, high-coloured urine, and impaired secretions, are more probably occasioned by the former, than by the latter pathological state.

19. *C. Of the states of the associated viscera in dyspepsia.* — It is obvious that indigestion will vary in form and severity, with the concomitance of disorder in any of the other digestive organs. — The functions of the DUODENUM may be deranged, as shown in that article; and, in this case, dyspepsia will present more or less of the characters there described (§ 2.). Other parts of the digestive canal may be deranged, the affection existing either in impairment of function, or in chronic or vascular irritation, and being limited to the stomach, or extending to the large bowels, or to the small intestine, or to the rectum. (See arts. CÆCUM, &c.) In such cases, the physician will be guided by the state of the evacuations, and by the symptoms detected on a careful examination of the abdomen. — It is not improbable that the pancreatic secretion becomes disordered, particularly in protracted cases; but of this sufficient proofs are seldom furnished: at best it can be only a probable inference. That this secretion may be diminished is not unlikely, inasmuch as there is sufficient evidence of the *biliary secretion* being deficient, retained, and altered, especially in the chronic states of indigestion; and it is reasonable to infer, that, when one of the organs deriving influence from the same part of the nervous system is impaired in its functions, the other organs thus associated, as well as otherwise anatomically connected, will be similarly, if not co-ordinately, affected. Indeed, every experienced practitioner must have noticed a more or less remarkable deficiency, or other disorder of the bile in dyspepsia; and not only of it, but also of the other secretions poured into the intestinal canal. That the disorder originally induced in the stomach, often extends to the other digestive organs, owing to various concomitant or conse-

cutive circumstances, cannot be doubted. It may be even apprehended, that the consecutive disorder will become the most serious in its nature and consequences, when these circumstances are frequent or continued in their operation; and that it will thereby obscure or mask the original affection. In many cases of dyspepsia, the functions of the biliary apparatus are impaired, in respect, not only of the quantity, but also of the qualities or properties of the secretion. In some, more or less of retention or obstruction of bile actually takes place, as shown by the state of the stools, rather than by the colour of the surface of the body. The removal of bile, also, in the biliary ducts and gall bladder, arising from impaired function of the stomach and torpor of the liver, will further increase the morbid state of the evacuations.

20. *D. Sympathetic affections of various organs.* — Whilst an immense number of diseases originate in neglected or protracted indigestion, various disorders are entirely sympathetic of it. Diseases of the urinary organs, of the liver and bowels, gout, rheumatism, various painful, neuralgic, and nervous affections, eruptions on the skin, disorders of the catamenia, and many others, often thus arise. Dr. WINSTON, in a treatise published in 1793, endeavoured to show this, before the appearance of the writings of Mr. ABERNETHY on the subject; but it had not been altogether neglected in the works of WHYTT and others. This excellent author very justly remarks, that a delicate state of the first passages, or an unnatural sensibility of their nerves, not only disposes to many complaints in those parts, but the whole nervous system is thereby rendered more liable to be affected by the slightest causes. "Faintings, tremors, palpitations of the heart, convulsive motions, and great fearfulness, may be often owing more to the infirm state of the first passages, than to any fault either in the brain or heart. The powers which the alimentary canal, when its nerves are disagreeably affected, must have in producing disorders in the most distant parts of the body, cannot be doubted by those who attend to that wonderful and widely-extended sympathy, which obtains between it and almost the whole system."

21. *a. The brain and organs of sense* are often much affected by indigestion. *Headach* is one of the most common and severe affections, sympathetically excited by this complaint; but it has received sufficient consideration in the article on its different forms. The manifestations of *mind*, both intellectual and moral, are also often more or less disordered, although but slightly or imperceptibly. Memory is somewhat impaired; attention is unsteady and cannot be long continued; the disposition is more fickle, and the temper more irritable than natural. There are often confusion of thought, or of ideas, lowness of spirits, despondency, and vertigo, particularly in severe or protracted cases. M. BROUSSAIS has argued with much apparent justice, that the functional disorder, thus sympathetically induced in the brain, may, by its frequency or continuance, pass into organic change; and several recent writers in this country have adopted the opinion.

22. *b. The organs of sense* are not less liable to sympathetic disorder. — The *sight* becomes weak and indistinct; the eyes impatient of light or irritable; and specks or muscæ volitantes appear in the

axis of vision. — *Hearing* is frequently impaired, often from weakness of the nerves; but sometimes in consequence of the erythematic redness and inflammatory irritation; symptomatically produced in the throat, having extended along the Eustachian tube to the internal ear; or having caused obstruction of this canal. Noises in the ear are usually present in these cases; and these, as well as the hearing, depend much upon, and vary with, the state of the stomach. Care should be taken, however, not to impute affections of the head and of the senses, depending upon disease within the cranium, to disorder of the digestive organs. The disorders of these parts, arising from the stomach and other digestive viscera, disappear or are mitigated by wholesome food and drink, taken in moderate quantity; but when they proceed from the brain, they are aggravated, or at least, not mitigated, by the usual ingesta.

23. *c.* In the article FLATULENCE, I have shown the effect produced upon the actions of the heart by this, and other causes of distention of the digestive tube. Palpitations, and irregularity and intermissions of the pulse very often proceed from dyspepsia, particularly when the functions of the liver and of the intestinal canal are also disordered. In such cases, the morbid sounds of the heart are usually wanting, unless in some cases of severe palpitation, when a slight bellows sound is heard. The functional disorder, when frequent or protracted, may be followed by dilatation or some other organic change. When structural lesion already exists in this organ, the symptoms are much increased by indigestion, and by concomitant disorder of the liver. It should, however, be recollected, that lesions of the heart often occasion congestions of the liver and dyspeptic affections; and always aggravate them, where they already exist.

24. *d.* The influence of dyspeptic complaints in producing affections of the lungs, was contended for by Dr. W. PHILIP, doubted by Dr. PARIS, but admitted, in a limited sense, by Dr. J. JOHNSON, and some others. The choice Dr. PHILIP made of the term "*dyspeptic phthisis*," was certainly not fortunate, inasmuch as its meaning is equivocal. In protracted dyspepsia, and particularly when the liver becomes congested, or otherwise disordered, the respiratory organs often also are affected; the disorder of the digestive viscera both predisposing to affections of the respiratory passages, and occasionally more directly causing them. The irritation excited in the œsophagus, pharynx, and top of the larynx, by the affection of the stomach, is sometimes propagated along the air passages; and if, at the same time, the stomach is frequently distended and the liver congested, so as to impede the circulation through the lungs, disease of this latter probably will often be induced, especially if latent tubercles, or some other states of predisposition, exist. Besides, the debility caused by protracted disorder of the digestive organs often calls latent tubercles into activity, or rapidly develops them; and it may even be suspected that the impaired nutrition, consequent upon the debility and protracted disorder of the organs of supply, will sometimes even give rise to tubercular productions, where they did not previously exist even in a rudimental state.

26. *iv.* THE CONSEQUENCES AND TERMINATIONS OF INDIGESTION* have been partially al-

luded to (§ 19, 20.); but they require more particular notice. (a) *Dyspepsia* may terminate in a restoration of the healthy function of digestion; — (b) It may pass into more severe functional or structural disorder of the stomach; — (c) It may superinduce disease of the liver, bowels, and other colluttitious organs; — (d) It may give rise to affections of remote organs or parts; — (e) and lastly, it may alter the constitution of the circulating fluids, originate diseased secretions and depositions, and generate a morbid diathesis of the system, occasioning several serious constitutional maladies. These consequences will, however, depend much on the exciting causes, the predisposition, the temperament, the habit of body, and other circumstances proper to the person affected.

27. *a.* A termination in restoration of healthy digestion seldom takes place, or if it take place, it is rarely permanent, unless the predisposing and exciting causes are avoided. Many of those causes originate in those propensities, desires, and passions, which are controlled with the greatest difficulty; and several of them depend upon habits, which require the utmost force of character to relinquish. Hence the want of success so often experienced in the treatment of dyspeptic complaints, and the dissatisfaction evinced by those who run from one physician to another, unreasonably expecting immediate or permanent relief, still desiring to indulge the senses — to gratify the propensities and desires, natural or acquired, without paying the penalties thereby incurred. Hence, also, the frequency of the serious consequences of severe or neglected dyspepsia about to be noticed.

28. *b.* The forms of indigestion already described, from neglect or the continuance of their causes, may pass into the more severe affections of the stomach. In some instances, the most violent *gastrodynia* or *gastralgia* supervenes on them. (See STOMACH — *Painful Affections of*.) In others, *Pyrosis* follows the form of irritative dyspepsia attended by the rejection of a glairy fluid, (§ 13.) and seems to be an extreme condition of the same complaint with modified character, depending upon peculiarities of constitution and local lesions of the stomach. Vomiting (see that article) is a still more prolonged character than this, and Dr. J. JOHNSON taking place in dyspepsia, occurs, even independently, although more frequently in consequence, of structural change of either the stomach or some other organ. In the latter case, the source of mischief may be in the liver, or in the brain, or even in the kidneys, or uterus. More rarely neglected *cardialgia* or other dyspeptic states pass into partial or complete *stomatitis*, (see that article), particularly when the meals are taken hurriedly, in large quantity, and insufficiently masticated (see AVIATION, in *Lond. Med. and Phys. Journ.* for May, 1821, p. 362.). Neglected dyspepsia is very frequently followed by inflammatory action, and its consequences in the villous coat of the stomach (see STOMACH — *Inflammation and Organic Lesion of*). This result, I am convinced would more frequently take place, and when it did occur, would lead to still more serious effects, but for the circumstance of the secretions from the villous coat favouring resolution by unloading the capillary vessels, and for the want of appetite and nausea attending inflammatory action, preventing the ingestion of substances calculated to keep up the morbid action.

28. *c.* The supervention of disease, functional or structural, in collatitious viscera, in the course even of the more simple and slight forms of indigestion, is so common, that the attention should never be withdrawn from it in practice. There are few cases of dyspepsia, in which the functions of the LIVER and DUODENUM (see those articles) are not more or less disturbed. The liver becomes torpid and congested, and sometimes more or less tumid, from either congestion in its vessels, or accumulations of bile in the ducts; this secretion being often inspissated from absorption, during its removal, of its more watery part. It then either obstructs, irritates, or otherwise, disorders the canals along which it passes (see art. GALL. BLADDER and DUCTS), and affects even the substance of the liver itself, which ultimately becomes inflamed, and gradually and variously changed. In protracted or severe cases of indigestion, other organs also become disordered, especially the bowels; constipation, colic, or diarrhoea, in some one or other of their forms, frequently occurring, particularly when irritation of the digestive mucous surface is induced, and when the secretions, poured into the intestines, are deranged.

29. *d.* Affections of remote organs, sympathetically produced by dyspepsia, have been already noticed (§ 20.), but there are others which arise from this complaint, rather by a succession of morbid changes, than by any sympathy or consent of parts. When protracted or severe indigestion gives rise to an imperfectly elaborated chyle; or when the impaired organic nervous energy, which is chiefly manifested in the functions of the stomach in dyspepsia, extends also to the circulating, assimilating, and excreting organs; affections of the kidneys, and urinary bladder, in connection with a morbid state of the urinary secretion, frequently take place. Hence the formation of sabulous matter or gravel in the urine, and of calculi in the kidneys and bladder; and even the production of diabetes, and of slighter disorders of the excretion of urine. In females, dyspepsia not unfrequently gives rise to various difficult, too frequent, or delayed or irregular menstruations, and to various and painful affections of the uterine system. In some portions or organs, the circulation, with tenderness in the cutaneous system. In both sexes, cutaneous eruptions either originate in, or are perpetuated by, dyspeptic disorders, and by the state of the circulating fluids, and of the cutaneous exhalation consequent upon them. A due recognition and estimation of these connections of disorder are of the utmost importance in practice.

30. *e.* There is every reason to infer, that the pathological conditions, of which dyspepsia is an early and important indication, by altering the functions of assimilation and secretion, and weakening the processes of depuration, may give rise to a state of the circulation, productive of painful affections, or of unnatural formations and depositions in weak or predisposed parts; or in other words, to a truly morbid diathesis, or constitutional derangement. Hence the frequency of rheumatism, of neuralgic or painful affections, of urinary calculi and gravel, and especially of gout, after protracted or severe indigestion.

31. II. CAUSES. — *A. Predisposing.* — Indigestion, although not confined to any period of life, occurs most commonly between the ages of twenty and forty-five; and in its simple form more frequently

in the female, than in the male sex. The upper classes of society and the middle ranks of life are most subject to this variety of the complaint. It is more prevalent in cold and temperate, than in warm climates, and in the winter than in the summer; but whatever may be the temperature of the climate or of the season, damp weather, and a moist atmosphere, may be regarded as among its most active predisposing causes. The predisposition to this disorder is sometimes hereditary, particularly in persons of a weak relaxed fibre, with high nervous susceptibility, and general debility of constitution. Those in whom the functions of the stomach are naturally weak and feebly performed, the circulation languid, the temperature of the extremities below the natural standard, and the secretions generally disordered, or more abundant than usual, are also constitutionally predisposed to dyspepsia. Sedentary occupations, especially when carried on in close rooms and factories, indolent habits either of body or mind, long and intense study, insufficient exercise in the open air, addiction to debilitating excesses and injurious indulgences, luxurious modes of living, indulgence in sleep or in bed, breathing impure air and confinement to close or ill-ventilated apartments, remarkably predispose to this complaint. In persons thus predisposed, the slightest excess or irregularity, or the most trivial exciting cause, is often sufficient to bring on an attack of indigestion; whilst a repetition of such causes, or long exposure to their action, in those of a stronger habit and more vigorous constitution, cannot fail to have a similar effect.

32. *B.* The exciting causes are divisible into two classes: — (*a*) Those which operate immediately or directly upon the stomach itself; and (*b*) Those which influence this organ through the medium of other parts. — (*a*) The causes, which affect the stomach itself, act either by diminishing or otherwise vitiating its secretions, so that the due change is no longer effected in the food; or by debilitating its muscular power, so that the aliment, although it may have been properly acted upon by the gastric juice, is not propelled into the duodenum with the natural ease and rapidity. As the admixture of the food with the gastric juice, and the passage of the chyme into the duodenum can only be accomplished by the due contraction of the muscular fibres of the stomach, it is evident that, whatever tends to weaken or to impede this action, will at once be followed by oppression or distention of the organ. In this class of agents may be included narcotics, taken habitually or in excess, as opium, hembane, conium, digitalis, &c., indulgence in ardent spirits, or intoxicating liquors, and the constant or frequent use of the preparations of ammonia, of lavender, and of other aromatic spirits. But the most common causes of indigestion are, irregularity and want of due caution in diet, whether as regards the quantity, or the quality and congruity of the food, or the periods at which it is taken, and the use of tobacco in any of the modes in which this noxious substance is so generally employed.

33. A want of due relation between the state and powers of the digestive organs, and the substances upon which they are required to exercise their functions, is a very frequent cause of this complaint; for whether the stomach be distended by

an unusual quantity of food; or whether its compelle

which are inappropriate, or to which it is unaccustomed, the function of the organ will be equally impeded; and if the exciting cause be powerful, or continue in operation, digestion will be altogether suspended. Hard and indigestible articles of food must therefore be productive of this disorder; and hence its frequency among the peasantry and lower orders. Heating and highly-seasoned articles of food, hot dishes, and condiments, mushrooms, shell-fish, melons, cucumbers, nuts, and similar substances; raw, stale, or unripe fruit; rich articles of confectionary; acid, iced, or sweet fluids, especially when taken during the process of digestion; large quantities of cold or of warm fluids, as of tea, relaxing slops, &c.; and the habitual use of malt liquor, are among the most common causes of indigestion. The kind of aliment also exerts no small influence, even in mechanically distending, and thereby weakening the stomach; for as most of the articles of food, when received into the organ, seem to swell in a greater or less degree, a bulky meal, particularly of solid or pulsatious or vegetable substances, will not a little contribute to this effect. To the above causes may be added, irregularity in the period between the times of taking food, hasty or imperfect mastication, frequent interruption or talking during the progress of eating, the omission of an accustomed meal, abstinence or long fasting, — hence its frequent occurrence during the fasts of the Catholic church, and among the Brahmins, Fakirs, &c., in India, — a sudden change in diet from animal to vegetable food, and from substances of a succulent and refreshing, to those of a dry and heating nature, and severe and repeated vomiting. All these tend, in a greater or less degree, to debilitate the muscular fibres of the stomach; to produce

deficiency of gastric secretion, or a secretion vitiated in its properties; and to irritate the villous coat of the organ.

34. b. Amongst those causes which operate on the stomach through the medium of other parts, we classed those mental emotions, which depress nervous power, or otherwise disorder its manifestations. A due secretion of the gastric fluid depends much on the state of nervous influence; and a deficiency of the latter impedes or lessens the power. Any sudden intelligence, a violent fit of passion, or of great joy, sometimes instantly brings on an attack of indigestion. Grief, anxiety, envy, jealousy, indulgence in tender feelings, repeated disappointment, reverses of fortune, night watching, &c., more slowly, but more certainly, exert a similar influence. Whatever exhausts the body and lowers the constitutional powers, exerts a correlative effect on the digestive functions, as venesections improperly adopted, or soon after a meal; protracted hæmorrhages; menorrhagia; leucorrhœa; venereal excesses; seminal weakness; and exhausting discharges of any kind. In persons particularly of a weak and delicate constitution, indigestion is easily induced by change of weather, by exposure to the night air or to cold and humidity, by cold extremities, by a low temperature when the body is quiescent, as when travelling in an open carriage or on the outside of stages, by a fatiguing journey, by damp residences, and similar circumstances. Whatever exerts a depressing effect on the organic nervous

power, or on any of the internal viscera, will lower the function of the stomach, as large doses of calomel, or too long a continuance of this medicine, irritating and drastic purgatives, &c. Dyspepsia may be brought on, also, by the suppression of the natural and the accustomed discharges, or by the retropulsion of cutaneous eruptions, &c. It also not unfrequently accompanies catarrhs, rheumatism, and diseases of the thoracic viscera; it is a necessary consequence of disorder of any other of the abdominal organs, and it precedes and attends the various states of gout, &c.

35. c. The irritative states of dyspepsia are more frequently met with in the male than in the female sex, and are very prevalent in the southern countries of Europe, and amongst Europeans resident in tropical regions. They are common in those warm climates in which the air is dry, and the temperature subject to frequent and sudden variations, but the causes acting directly on the stomach are often frequent and influential in those countries. In warm climates, the modes of living — the diet and regimen of Europeans — are extremely prejudicial to the digestive functions, as shown by Mr. ANSTON, and the Author. (*Researches on the Diseases of India and of Warm Climates, generally, &c., 4to. vol. i. p. 226.*) The quantity and nature of the food and drink usually taken excite and irritate the stomach, liver, and intestinal canal, and exhaust their functions; the states of indigestion thus induced soon passing into inflammation, or into organic changes, if neglected or injudiciously treated.

36. The irritative states of dyspepsia are, however, by no means uncommon in this country, in hot seasons, and even in very cold weather, and during the prevalence of severe or long continued frosts, accompanied by north-easterly winds. They affect chiefly persons of a sanguine and bilious temperament, and of plethoric habit; and in them, especially, are sometimes produced by checked perspiration, by the suppression of accustomed discharges, as of hæmorrhoids, of leucorrhœa, of the catamenia, &c., by drying up of the skin, and by the repulsion of the secretions. They are, however, more commonly induced by the abuse of stimulants, as highly seasoned rich food, and by addiction to spirituous and intoxicating liquors, and to opium. These states of indigestion are not so often consequent upon errors in diet, as the other forms of the complaint; but they are most frequently met with in the habitual drunkard. They may be induced by change of diet, or change of residence, or climate, and hence their greater prevalence during spring and autumn; by stimulating medicines, as a long continuance of the use of cubebæ and copaba for gonorrhœa; by drastic and irritating purgatives; by powerful or repeated emetics; by tonic, stomachic, and aromatic spirits or tinctures, taken in too large doses, or on improper occasions; by hot spices and pickles, particularly cayenne pepper, capsicums, &c.; by the frequent use of mercurial and of heating medicines; by drinking cold and acid fluids after violent exercise, or whilst the body is perspiring; and by various noxious articles, used either as food or drink, or which give rise to incongruous mixtures in the stomach.

37. III. PATHOLOGY. — Indigestion manifestly proceeds from the following conditions of the sto-

mach and related organs, either of which may be somewhat more prominent than the rest:—1. Impaired organic nervous power of the stomach. 2. A deficient or disordered state of the gastric juice, or a want of a due relation between the quantity and nature of this fluid and the ingesta. 3. Impaired absorbing power of the stomach, rendering the digestion of the fluid ingesta more or less difficult, and weakening the gastric fluid. 4. Diminished muscular energy of the stomach; the motions and tonic peristaltic actions of the organ being weakened, and the admixture of the gastric juice with the ingesta being thereby impeded or delayed.* These

* As Dr. COMBE observes, the first requisite to digestion is an adequate supply of gastric juice, and its thorough admixture with every particle of the food on which it is to operate. The second is a steady temperature of about 98° or 100° Fahr. The third is the gentle and continued agitation of the alimentary mass in the stomach during the digestive process.—Much light has been thrown upon the function of digestion, and consequently upon disorders of this function, by the experiments of Dr. BEAUMONT, of America, on Sr. MARTIN, a strong young Canadian, who was wounded in the left side, a fistulous opening into the stomach remaining without detriment to the general health. For some months after the wound, the food could be retained only by wearing a compress and bandage; but early in winter, a small fold or doubling of the villous coat began to appear, which gradually increased till it filled the aperture and acted as a valve, so as completely to prevent any efflux from within, but to admit of being easily pushed back by the finger from without.

Dr. BEAUMONT describes the aperture in Sr. MARTIN'S stomach as being situated about three inches to the left of the cardiac, near the left or superior termination of the great curvature. When the stomach was nearly empty, he was able to examine its cavity, to the depth of five or six inches by artificial distention. When it was entirely empty, the stomach was always contracted on itself, and the valve generally forced through the orifice, together with a portion of the mucous membrane, equal in bulk to a hen's egg. After sleeping for a few hours on the left side, the protruded portion became so much larger, as to spread over the neighbouring integuments five or six inches in circumference, fairly exhibiting the natural rugæ, villous membrane, and mucous coat, lining the gastric cavity. This appearance was almost invariably exhibited in the morning before rising in bed.

The first point which Dr. BEAUMONT conclusively established, is, that the gastric juice does not continue to be secreted between the intervals of digestion, and does not accumulate, to be ready for action upon the next meal. The next which he established, was, that in health, the gastric juice is always in direct relation to the quantity of food actually required by the system; so that, if the food is taken, there will be too small a quantity of gastric juice for the digestion of the whole. Dr. BEAUMONT further ascertained that the gastric secretion, and the villous coat, undergo great changes during disease. In the course of his attendance on Sr. MARTIN, he had opportunities of seeing what was actually going on in the organ, and of observing, that whenever a febrile state was induced by obstructed perspiration, or by stimulating liquors, or by overloading the stomach; and that when induced by fear, anger, or other emotions, depressing or disturbing the nervous system, the villous coat became sometimes red and dry, and at others, pale and moist, having lost its smooth and healthy appearance. As a necessary consequence, the secretions became vitiated, impaired, or suppressed; and the follicles, secreting the mucus which protects the surface of the villous coat, became flaccid, and no longer yielded this bland secretion. The nervous and vascular papillæ thus deprived of their defensive shield were then subjected to undue irritation. When these diseased appearances were considerable, the system sympathized, and dryness of the mouth, thirst, quickened pulse, &c., showed themselves; and no gastric juice could be procured or extracted, even on the application of the usual stimulus of food. The dry, irritated appearance of the villous coat, and the absence of the healthy gastric secretion in the febrile state, as Dr. COMBE has remarked, not only explain at once the want of appetite, nausea, and uneasiness generally felt in the region of the stomach; but also show the folly of attempting to sustain strength, by forcing the patient to eat, when the food cannot be digested, and when nature instinctively refuses to receive it.

The inferences, drawn from the experiments and observations, of Dr. BEAUMONT and others, that more

pathological conditions may be primary, or they may be consecutive upon disease of the brain, of

immediately concern the subject under consideration, may be stated as follows:—

1. That the processes of mastication, insalivation and deglutition are important, not merely as subjecting the food to the gastric juice in a state of due preparation for its action, but also as allowing time for the regular contraction of the stomach upon each individual morsel conveyed into it, as well as transmitting the food in small portions at a time, so as to prevent a too rapid or excessive, and injurious distention of the organ.—

2. That the gastric juice is the agent of chymification; that it is secreted from vessels distinct from the mucous follicles; that it is a clear transparent fluid, without odour, a little salt, and perceptibly acid; and that it contains free hydrochloric acid, a little acetic acid, and some other active chemical principles.—

3. That this juice is never found free in the stomach, but is always excited to discharge itself by food or other irritants; that it is seldom obtained pure, but generally mixed with mucus, and sometimes with saliva; and that, when pure, it is capable of being kept for months, or even years.—

4. That it is a solvent of food, and alters its properties; that it checks the progress of putrefaction, corrects putrid substances, coagulates albumen and milk, and afterwards dissolves the coagula; and that it commences its action on food as soon as it comes in contact with it.—

5. That it is capable of combining with a certain fixed quantity of food; and when more is presented for its action than it will dissolve, indigestion will ensue; and that its action is facilitated by the warmth and motions of the stomach, these motions taking place chiefly in two directions, transversely and longitudinally.—

6. That the gastric juice is modified in quantity, and probably in its intimate constitution, so as to suit the kind of food, and hence the occurrence of indigestion on sudden alterations of the kinds, quality, and quantity of food.—

7. That the action of the stomach and of its fluids is the same on all kinds of diet; and that the motions of the stomach produce a constant admixture of food and gastric juice, and thereby facilitate digestion.—

8. That solid food, of a certain texture, is easier of digestion than fluid; that animal and farinaceous aliments are more digestible than vegetable; but that susceptibility of digestion does not depend altogether upon natural or chemical distinctions.—

9. That digestion is facilitated by minuteness of division, and tenderness of fibre, and retarded by opposite qualities.—

10. That the ultimate principles of aliment are always the same, from whatever food they may be obtained.—

11. That chyme is homogeneous, but variable in its colour and consistence; and that, towards the later stages of chymification, it becomes more acid and stimulating, and passes more rapidly from the sto-

12. That soups and other liquid food do not call into play the muscular coat of the stomach; and before the gastric juice can act upon them, the fluid part must be absorbed and the mass thickened to a proper consistence for undergoing the usual churning motion; and, consequently that this kind of food often gives rise to acidity, particularly in weak states of the stomach.—

13. That, owing to the adaptation of the gastric juice to the nature of the food, sudden or extreme changes from one kind of diet to another is injurious; for the stomach has not had time to modify its secretions sufficiently to meet the altered demand upon its powers.—

14. That water, as a solvent of food, and most other fluids, are not affected by the gastric juice, but pass from the stomach soon after they have been received; that heating condiments are injurious to the healthy stomach; and that the use of spirits always causes disease of this organ, if persevered in.—

15. That bulk, as well as nutriment, is necessary to articles of diet; and that digestibility does not depend upon the quantity of nutrient principles that aliments contain.—

16. That the quantity of food generally taken is more than the wants of the system require; and that such excess, if persevered in, generally produces functional disorder, and consecutively, organic disease.—

17. That oily food is difficult of digestion, though it contains a large proportion of nutrient principles.—

18. That bile is not usually found in the stomach, and is not necessary for the digestion of food; but that, when oily food is used, it assists digestion.—

19. That the gastric exercise facilitates digestion; and that the acetic, citric, and hydrochloric acids promote this process, particularly if vegetables and indigestible substances have been taken.—

20. That the time required for the stomacheal digestion

the liver, of the intestines, of the heart, of the kidneys, or of any other organ; or they may be part only of some more general malady. Dyspepsia may thus be *idiopathic* or *symptomatic*. As presented to the physician in practice, indigestion is generally owing to the above conditions, in connection with the following:—1. Deficiency, as to quality and quantity, of the fluids derived from the liver, pancreas, and intestinal mucous membrane. 2. Disorder of the circulation and functions of this membrane; and 3. Disorder of the consecutive and harmonious actions of the muscular coat of the small and large intestines.

38. IV. TREATMENT.—There are few diseases which require greater attention to its causes, and to its various states during the treatment, than this. The objects of the practitioner are:—1. To ascertain the predisposing and exciting causes; 2. To draw a rational inference as to the pathological states on which the complaint depends; and 3. To examine into its associations, and to attend to the nature and relation of its complications, whether primary or consecutive. Guided by these general intentions, the more special indications are:—1. To avoid the causes; 2. To give immediate relief to the more urgent symptoms, as acidity, cardialgia, flatulence, pain, costiveness, &c.; 3. To remove the pathological states and their consequences; and 4. To prevent a return of the disorder. These indications require to be fulfilled by means appropriate to the particular form of the complaint.

39. 1. Treatment of the Asthenic Form of Dyspepsia. A. In the more acute states, it is sometimes necessary to remove the load by which the stomach is oppressed, or the substance by which it is irritated, by an *emetic*. But, unless when it is obvious that the disorder depends upon this cause, emetics are injurious, particularly a repetition of them. In such circumstances, the effect is soon produced by irritating the fauces by a feather, or with the finger; by a warm infusion of chamomile flowers; by tepid water, with common salt, or with an aperient salt, and by ipecacuanha. When pallor of the countenance, nausea, oppression, and the sense of a load at the epigastrium, and rancid or bitter eructations are present,

depends upon the quantity and kind of food, and upon the state of the stomach; that the time required for the disposal of a moderate meal, in a healthy state of the organ, varies from three hours to three hours and a half or four hours; and that in states of indigestion, the process is delayed much longer than this, particularly as respects the more indigestible substances.—

21. That a diminution of the temperature of the stomach below 98° impedes digestion; and that the temperature of the organ is not necessarily elevated by the process.—

22. That whatever promotes organic nervous power, without exhausting it, favours digestion, as breathing a dry, moderate, laughing, &c.—

23. That the organic or ganglionic nervous influence is more concerned in the process of digestion, than the influence conveyed to the stomach by the eighth pair of nerves; and that the circulating, absorbing, and especially the secreting functions of the organ are under the dominion of the former, whilst the sensibility and muscular contractions are directed by the latter.—

24. That the inference drawn by Dr. W. PHILIP from his experiments, as to digestion depending upon the influence of the eighth pair of nerves, and as to galvanism being capable of supplying the place of this influence, are unphilosophical, as they are formed without due consideration of all the circumstances, and as they leave out of the account the shock given to the system by violent operations performed in these experi-

ments are indicated; and these are the suitable means. But after the organ is even, its functions should be restored by repose, and small quantities of seltzer water, of iced water, a cooling aromatic water, with spearmint, &c. Food should not be given till the appetite returns, when the lighter and more palatable articles may be taken. The bowels afterwards require to be evacuated, either by stomachic aperients, as rhubarb, with magnesia or soda, in an aromatic water, or aloes with an alkali, as in the compound decoction, or by enemata. Most of the means recommended in the article CONSTIPATION (§ 15. et seq.), and in several of the Formulæ of the Appendix, will likewise be appropriate in these circumstances.

40. When nausea continues after the stomach and bowels have been evacuated, or when the vomiting is protracted after offending matters are removed, medicines to relieve these symptoms should be prescribed, especially the *hydrocyanic acid*, in camphor julep, with a little compound spirit of lavender, or tincture of cardamom, or a drop or two of *kresote*, in the form of a pill, with powdered liquorice root. Effervescent draughts, with citric acid and ammonia, this last being somewhat in excess; or the liquor ammoniac acetatis, with camphor mixture, or with spearmint water; or calcined magnesia, in this or in any other aromatic water, will also be serviceable. If these fail of affording relief, active purgative enemata will generally be efficacious, the symptoms disappearing as soon as a free action of the bowels is procured.

41. Heartburn is best treated by medicines, which act upon the secretions, and move the bowels. Rhubarb, with magnesia, and sesqui-carbonate of ammonia, in an aromatic water; blue pill, with castile soap; and alkaline solutions in bitter tonic infusions, or in lime water, are commonly employed, and are most useful when this symptom is connected with acidity. But when heartburn is attended by rancid, septic, or insipid eructations, the mineral acids, the nitric, the hydrochloric, and the aromatic sulphuric acids, given in simple camphor, or aromatic water, or in suitable tonic infusions, will be most serviceable. Dr. TOWN advises lemon-juice in these cases, and Dr. TOWN the phosphoric acid. When there is a liability to heartburn, wine, spirits, and particularly malt liquors, should be avoided. Hock or old sherry may, however, be taken in great moderation, in seltzer water.

42. Pain, or the slighter states of morbid sensibility, will be best removed by the *trisnitrate of bismuth*, conjoined with extract of hop, or extract of hyoscyamus; by *hydrocyanic acid* or *kresote*, as directed above (§ 40.); by other anodynes, given with aromatics and antispasmodics; by the compound or foetid spirit of ammonia, in suitable vehicles; by the compound galbanum pill, or the compound rhubarb pill, with henbane and ipecacuanha; by draughts of warm water, either alone, or with an alkali, or with magnesia. If pain be severe, and if vomiting have come on spontaneously, and continued after morbid matters are removed, a full dose of *opium*, with an aromatic, or of the acetate or hydrochlorate of morphia, similarly combined, should be prescribed. But the propriety and frequency of repeating it will depend upon the circumstances of the case. If fla-

tolerance is troublesome, the means already advised may be prescribed, or those recommended in that article (§ 15.) may be employed. Friction over the epigastrium, especially with a stimulating liniment, will also give immediate relief from both pain and flatulence. When *headach* is present, the treatment proposed for *Dyspeptic Headach* (§ 46.) should be directed. For the *ostiveness* so generally attendant upon this form of indigestion, the medicines already noticed, or those about to be prescribed, or a combination of mild aperients with tonics, deobstruents and alteratives being given occasionally at night, will prove of great service.

43. After an acute attack of dyspepsia, particularly when occasioned by errors of diet, it is necessary to enjoin abstinence, and thus afford the stomach time for repose, until its organic sensibility and functions begin to return. After a while, a cup-full of mutton or veal broth, or of green tea, or of coffee without milk, may be given and repeated; or a wine-glass full of port-wine negus may, in some cases, be allowed. But cure should be taken in returning to a full diet; and the injunctions as to diet about to be stated ought to receive attention. In general, tonics and stomachics should not be prescribed until the functions of the stomach are returning.

44. *B.* Having removed the more acute attack of asthenic dyspepsia, with its urgent symptoms, the remaining disorder is in all respects the same as the more slight and chronic states of the complaint, and requires a similar treatment to them. The third intention of cure (§ 38.) should now be carried into effect; and the organic nervous energy, the secretions, and the muscular tone of the stomach be improved. This intention is to be effected chiefly by the diet and regimen hereafter to be noticed; but a judicious recourse to medicine will also prove of great benefit. The infusion of cinchona, of columba, of gentian, chamomile, spargania, cascarrilla, will be severally useful, with the alkaline carbonates, and small doses of stannic tinctures. Afterwards, if metallic tonics, the tincture of the sesquioxide of iron, the sulphate of iron, the sulphate of zinc, the trisnitrate of ammonia, and the mineral acids, will generally be given twice. Several of these may be given with the extract or tincture of hop, or of hyoscyamus. Lime water may be taken with aromatics, particularly when the bowels are much relaxed; and the aerated, or alkaline chalybeate waters may be used. When there is no complication contraindicating cold bathing or the shower bath, it will be advantageous to resort to them frequently; and when uneasiness at the epigastrium is often felt, a warm plaster will be worn in this situation with benefit.

45. The most active or varied means employed to restore the functions of the stomach will be frequently inefficient, if the offices of the colluctitious viscera be imperfectly performed. The *biliary secretion* should therefore be promoted or corrected by occasional doses of blue pill, or Plummer's pill with soap, and the bowels preserved moderately open by mild purgatives, or by a combination of them with bitters and tonics. With this view, rhubarb may be conjoined with aloes, guaiacum, and ipecacuanha, or with magnesia; the infusion of senna, with the infusion of gentian; the compound decoction of aloes, with

the decoction or extract of taraxacum; the sulphate of potash with rhubarb; the purified extract of aloes with castile soap, &c. — These and other mild purgatives may be taken in other combinations, as draughts, mixtures, or pills, as prescribed in numerous and various forms in the *Appendix*, and in the article *CONSTIPATION*. A judicious combination of bitters with mild purgatives, as, of sulphate of quinine, or inspissated oxgall with aloes (F. 562. 575.); the infusion of senna with any of the bitter infusions (F. 266.); and the decoction of aloes, with soda and infusion of columba, will generally be extremely useful in this state of the complaint.

46. When chronic asthenic dyspepsia is attended, not only by a torpid state of the liver, but also by incipient cachexia, or has given rise to cutaneous eruptions, &c., much benefit will result from the simple preparations of sarza, with liquor potassæ or Brandish's alkaline solution, and extract of taraxacum. If it have occasioned difficult or impaired menstruation, or a state of incipient chlorosis, as often observed in females in London, the preparations of iron, particularly the *mistura ferri composita*, the decoction of aloes being taken so as to act freely on the bowels; or the *pulvis ferri compositus*, conjoined either with the pil. aloes cum myrrha, or the pil. aloes composita; will generally remove all disorder, if sufficiently persisted in, and aided by change of air, diet, and exercise.

47. In this form of dyspepsia, the restoration of the digestive functions much depends upon a healthy state of the other excreting organs, as well as of the bowels. The functions of the kidneys and of the skin should be duly promoted and corrected. The temperature of the general surface, and the exhalations from it, ought to be preserved, and the urine duly examined, in order to ascertain, not only its appearance, but the general character of its chemical constituents. As these vary, or, as certain of them predominate, so should some of the most efficacious medicines, prescribed in the complaint, be varied or altogether changed; so should tonics be conjoined with alkalies or acids; and aperients and alteratives be given with absorbents or deobstruents.

48. *ii. The irritative variety of dyspepsia* requires very different means of cure from those just advised; but the removal of the exciting causes is as necessary in the treatment of it as in that the foregoing. — *a.* In the more acute states of this variety, when pain, tenderness, heat, or soreness is felt in the epigastrium, although the vascular disorder of the villous surface may not amount, it nearly approaches to inflammation; and erethism, or vascular congestion, at least, exists. The application of leeches to the epigastrium then becomes necessary. In plethoric persons, a *bleeding* from the arm should be preferred. In those who have suffered from hemorrhoids, or obstructions of the liver, *cupping* on the hypochondria, and in females, whose catamenia are deficient, leeches to the groins may be prescribed. Afterwards a large rubefacient plaster, formed either of equal parts of the compound pitch and ammoniacal plasters, or of seven parts of the former with one of the cantharides plaster, should be applied over the epigastrium. The blue pill, or hydrarg. cum creta should be taken at bed-time, and a mild aperient in the morning. Fresh castor oil,

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assisted by cathartic enemata, will be useful in this variety. In some of the more acute cases, a full dose of calomel, either alone, or with a little James's powder, will be of service. Although calomel, when frequently exhibited, weakens the nervous energy, yet an occasional dose diminishes vascular action in the villous coat of the stomach, and excites the actions of the lower bowels. It should be followed by mild purgatives and active enemata; for by increasing the organic actions of the lower portion, the morbid states of the upper parts of the digestive tube, will the more readily subside. When this variety of dyspepsia is attended by an erythematic redness, or soreness of the fauces and pharynx, as it frequently is, sometimes extending down along the oesophagus, calomel, taken in the form of powder, aided by mild aperients and active enemata, will be of essential service, not only in acting in the manner just stated, but also in promoting the secretions of the liver and intestinal canal.

49. The other *urgent symptoms*, noticed with reference to the former variety, are generally much more severe in this, and require a somewhat modified treatment. But irritation, crethism, congestion, or even inflammatory action of the villous coat, are not the only pathological states characterising cases of this kind. Organic nervous power, the secretion of the gastric juices, and the tone of the coats of the stomach, are more or less weakened or disordered, and require to be strengthened, as well as corrected. At first, cooling medicines and diaphoretics are required, in order to remove irritation or vascular excitement; but they should afterwards be conjoined with mild tonics or gentle restoratives, and aided by a light farinaceous diet (§ 72.). If nausea or vomiting occur in this variety, the means already prescribed (§ 40, 41.) will generally remove them.—If they proceed from irritating ingesta, the gentle measures noticed above (§ 39.) will procure their expulsion. Afterwards small doses of the nitrate of potash, and of the solution of the acetate of ammonia, may be taken in camphor water.—When this variety is caused by intemperance, these medicines, aided by abstinence, will prove particularly serviceable. If pain or internal heat is complained of, or if vomiting continues after offending matters are removed, or after vascular depletion has been practised, the warm turpentine epithem, or a mustard poultice, may be applied over the region of the stomach, or one of the liniments above referred to, may be used as an embrocation in the same situation. The anodynes advised for the asthenic variety may also be taken, and cathartic enemata administered, until the bowels are freely evacuated. The medicines already recommended for heartburn, and for other unpleasant symptoms, will also be appropriate, after having had recourse to the means just advised.

50. *b. In the chronic states of irritative dyspepsia*, local depletions are requisite, only when there is evidence of plethora, or of increased action, or when natural secretions or accustomed evacuations are suppressed. Small doses of mild mercurials at bedtime, the simple preparations of sarza, either alone or with liquor potassæ, and external derivatives, are here extremely beneficial. After the secretions have been improved by these, and the excreting functions restored, the milder

tonics conjoined with refrigerants and diaphoretics or anodynes, will be of great service. The decoction of Iceland moss and various other demulcents may be taken with hydrocyanic acid; and a plaster, consisting of either the ammoniacal, the compound pitch, or the compound galbanum plaster, may be worn on the epigastrium. I have generally preferred a plaster, consisting of equal parts of the compound pitch, and of the ammoniac-mercurial plasters, and prescribed the following:—

No. 262. R Potassæ Nitratis 3 ss.; Liquor. Ammoniac Acetatis 3 i.; Infus. vel Decocti Cinchonæ 3 iii.; M. Capiat Coch. ii. vel iii. Larga bis terve in die.

No. 263. R Potassæ Nitratis 3 i.; Liquoris Ammoniac Acetatis 3 i.; Aquæ Flor. et Infusi. Aurantii Comp. 3 iiss.; Muc. Capiat tertium partem, ter in die.

No. 264. R Acid. Hydrocyanici, M. ii. Mist. Amygdal. Dulcis; Aquæ Flor. Aurantii, et Mistur. Camphor. aa 3 ss. M. Fiat Haustus ter in die sumendus.

No. 265. R Infusi Lupuli, 3 iiss.; Acid. Hydrocyanici, M. viii.; Tinct. Aurantii et Tinct. Gentianæ comp., aa 3 ii.; M. Capiat quartam partem bis terve in die.

No. 267. R Infusi Valerianæ, 3 x.; Acid. Hydrocyanici, M. iii.; Solut. Carbonatæ, gr. x.; Tinct. Cardamom. comp., 3 i.; Spirit. Lavand. comp., 3 ss.; M. Fiat Haustus in die sumendus.

51. *iii. Treatment of the earlier consequences of dyspepsia.*—The treatment of several of these is fully discussed in the articles DUODENUM, FLATULENCE, HEADACH, HYPOCHONDRIASIS, PYROSIS, and STOMACH—Painful Affections of.

It will therefore be unnecessary to advance much under this head.—*a.* When dyspepsia, in either of its forms, causes frequent attacks of relaxation and soreness of the throat and fauces, or inflammatory redness of these parts with cough, the diet of the patient should be strictly regulated, and mild purgatives, aided by cathartic enemata, prescribed. These attacks should not be neglected in persons presenting any tendency to bronchitis, or to pectoral disease. Some of the severest states of laryngitis and tracheitis have originated in irritative dyspepsia, the symptomatic irritation of the pharynx and fauces extending to the larynx, and exposure to cold, to currents of air, or to other causes, heightening the affection of the respiratory passages. A predisposition to affections of the respiratory organs, or tubercles in a latent state, are then often called into activity by neglected dyspepsia, owing either to symptomatic irritation or to consequent debility. In females, excessive menstruation, as to either the frequency or quantity of the discharge, is often the more immediate consequence, or intervenes between the dyspeptic disorder and the pulmonary affection. In such cases, the treatment should be directed both to the original disorder, and to the consequent affections; and fortunately, much of the means, both medicinal and dietetical, is appropriate to both; the more astingent and refrigerant tonics, and mild or cooling aperients, benefiting the disorder of the stomach as well as the superinduced complaints. To these medicines, ipecacuanha, camphor, and narcotics, will be added with advantage.

52. *b. The symptomatic disorder of the heart*, consequent upon one or other of the varieties of dyspepsia, requires chiefly attention to the original complaint. When palpitation is frequent, or the pulse intermitting, after the bowels have been

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ly evacuated, and the secretions improved, camphor and ipecacuanha with hyoseyamus, — the sulphate of iron with extract of hop, — the decoction of senega with orange-flower water, or infusion of orange peel, and hydrocyanic acid, — the infusion of valerian similarly combined, — the nitrate of silver triturated with the extract of henbane, or of hop, will severally afford relief. In the irritative states of dyspepsia, particularly if signs of constipation, erethism, or inflammatory irritation, of the villous coat be present, the treatment advised above for this state ought to be premised. At the same time, some one of the warm plasters already prescribed may be applied to the epigastrium. In 1820 I first employed the *nitrate of silver*, combined with narcotics, for a case of dyspeptic palpitation, commencing with half a grain thrice daily, and increasing the dose to one grain. This patient, and others similarly affected, for whom I have ordered this medicine, perfectly recovered. Dr. J. JOHNSON has strongly recommended the nitrate of silver in dyspepsia; and certainly few medicines are more deserving adoption, when the patient is not alarmed at its use. It should, however, be very cautiously employed. This writer also insists much upon the use of the *sulphate of quinine* in most dyspeptic cases. In small doses, with sulphuric acid, in infusion of roses, it is an excellent medicine at that stage of the treatment when active tonics should be prescribed, especially when much debility is complained of. In order to prevent its constipating effects, it may be given with small doses of the purified extract of aloes, or with the aloes and myrrh pill; and when palpitations and other nervous symptoms exist, camphor and hyoseyamus will be added to them with great benefit. In females who have long laboured under dyspepsia, the quinine taken in solution is very serviceable when the catamenia are too abundant; but in other circumstances, particularly when a *chlorotic* state of the system, and impaired or obstructed menstruation have supervened, the *sulphate of iron* with the aloetic preparations should be preferred.

53. c. Of all the consequences of protracted and irritative dyspepsia, *disorder of the biliary functions and disease of the liver*, are the most common. In evidence of congestion, or fulness, or tenderness in the region of the liver exists, then the treatment should be commenced with general or local depletions — with cupping on the hypo-chondrium, or near the right shoulder-blade, or with the application of a number of leeches near the epigastrium, or around the anus. Small doses of blue pill, or of calomel, ought to be taken occasionally at bedtime, and to be followed by saline aperients in the morning. Alternative medicines consisting chiefly of the alkaline carbonates, or of the liquor potassæ, should be given daily, with taraxacum, sarsæ, and such of the other remedies above recommended, as may be appropriate to the case; but the treatment of this complication is fully discussed in the articles GALL-BLADDER and DUCTS, JAUNDICE and LIVER.

54. d. *Cutaneous eruptions*, both acute and chronic, frequently are associated with the more protracted states of dyspepsia, and are often consequences of these states. Yet they are seldom referred to these sources, or to these conditions of the villous surface of the stomach, of the digestive mucous surface generally, and of the biliary and

other excreting functions with which they are so intimately connected. In numerous instances, heating, stimulating, and irritating medicines are prescribed, either prematurely, or at a time or stage of the treatment of these eruptions, when local or general depletions, refrigerants, evacuants, alteratives, and a low cooling diet, ought to have been employed. This remark is applicable also to those early indications of biliary disorder, of affections of the kidneys and urinary bladder, and especially of gout, which so often appear in the course of chronic indigestion.

55. OF THE DIET AND REGIMEN IN DYSPEPSIA. Unless the diet of the dyspeptic be duly regulated, medical means will be employed in vain. On the subject of diet with reference to indigestion, Dr. PARIS, Dr. A. COMBE, Dr. ROBERTSON, Dr. TICKNOR, Dr. T. J. TODD, and Mr. MAYO, have furnished much information of the best kind, and conveyed it in the most agreeable manner. It is impossible to adduce any thing on this topic which has not been already stated and illustrated by these able writers. — i. In considering diet with reference to indigestion generally, there are various circumstances requiring particular notice: 1st, The kinds and quality of the food; 2d, The quantity and congruity of the food; 3d, The times of eating, or the periods which should intervene between meals; 4th, The kind and quantity of drinks; and 5th, The conditions deserving notice in connection with eating and drinking.

56. A. *The kinds and quality of food.* — a. Dr. COMBE justly remarks, that a direct relation ought always to subsist between the qualities of the food and the nature of the constitution which it is intended to support. The highly concentrated and stimulating food necessary for the support of those who take very active exercise will prove too exciting to the irritable constitution of persons possessed of great activity of the brain and nervous system; and the generous diet, which suffices to rouse or support a phlegmatic system, will prove too nutritive for a person of a florid and sanguine temperament. For persons of a florid complexion, with great activity of the circulation, and a consequent liability to inflammatory diseases, the food ought to be calculated to soothe rather than to stimulate. Red meat, spices, wines, and fermented liquors, ought to be used sparingly, and the principal support derived from soups, fish, mucilaginous vegetables, acidulous fruits, and diluting drinks. In lymphatic persons, on the other hand, where the circulation is weak and slow, and the functions feeble, benefit is derived from a larger proportion of animal food, while vegetables, soups, and fluids, prove relaxing. To these persons, wine in moderation and spices are useful, if much exercise be taken. Persons of a highly nervous temperament, of great excitability, and sensibility to impressions, are injured by heating or stimulating diet. White meats, as fowl and fish, farinaceous and mucilaginous aliments, and ripe fruits, are most appropriate to them. Where the bilious temperament predominates, and much active exercise is taken in the open air, a full supply of animal food is necessary, and a moderate allowance of wine or other stimulus is borne with less detriment, if not with more advantage, than in the sanguine and nervous temperaments. Where the constitution is of a mixed nature, a diet composed of animal and

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vegetable substances in nearly equal proportions is, under ordinary circumstances, the best. — The food, also, should be adapted to the age, state of health, and mode of life of the individual, and to the climate and season of the year. A diet which would be quite sufficient to a person of sedentary occupations, would be inadequate to support an individual subjected to frequent or constant exertion; and in warm climates and seasons, a smaller supply of food, particularly of a heating or stimulating kind, is necessary, than in cold and temperate countries. In the former but little animal food is requisite; in the latter, especially in very cold regions and in rigorous seasons, an abundant supply of this kind of diet becomes indispensable.

57. *b.* Although there are few articles of diet which a healthy person, leading a sufficiently active life, may not eat with impunity, there are many which ought to be preferred, and others which should be avoided, by the dyspeptic. *Vegetables* are slower of digestion than animal and farinaceous aliments, and more liable to undergo the acetous fermentation in weak stomachs, and to occasion acidity and flatulence. Fat and oily meats are very indigestible, and give rise to acid or rank eructations and heartburn. Soups and liquid food are acted upon by the stomach with great difficulty; and, if the diet consist chiefly of them, they furnish insufficient nourishment, and never fail of producing the more severe forms of dyspepsia, and the diseases of debility. Soups are hurtful when taken at the commencement of a full meal; but when little or no animal food is eaten along with them, and rice or bread is taken with them, so as to promote their consistency, they are digested with greater ease. Pastry, pudding, rich cakes, and articles containing fatty or oily matter, are the most indigestible of all kinds of food. Plain well-cooked animal food, particularly venison and game, kept a due time after it has been killed, and eaten in moderate quantity, with bread, or with roasted, mashed, or dry mealy potatoes, or with rice, is one of the most digestible meals that can be taken by the dyspeptic. The kind, however, of animal food, and the modes of dressing it, should depend much upon the state of disorder, and the age and constitution of the patient.

58. *c.* *Fish* holds an intermediate rank between the flesh of warm-blooded animals and vegetable food, as respects digestibility. It is less nutritious than mutton or beef; and a larger quantity requisite to satisfy the appetite. Whiting, haddock, and skate, are the most digestible of salt-water, and perch of fresh-water fish. Gurnard, cod, soles, and turbot, are successively richer and heavier, but easier of digestion than mackerel, herrings, eels, or salmon. Eels are, however, more digestible when they are stewed. Salmon is very indigestible, as usually obtained from the London fishmongers, for the reasons stated in the article DISEASE (§ 46.); but it is not indigestible when quite fresh and properly cooked. The same observation applies to mackerel and herrings. Fish is most digestible when *boiled*; it is less so when *broiled*; and the least so when *fried*. The dyspeptic should eat it dressed only in the first of these ways. Shell-fish is slow digestion; some much more than others. Raw oysters are more digestible than crabs or lobsters;

but oysters, when stewed or otherwise cooked, are heavier than either. Fish is often rendered indigestible by the sauces, &c., taken with it. Vinegar, however, and lemon-juice promote the digestion of it. Mult liquor ought not to be drunk with fish. Fruit should not be eaten with it; and milk, likewise, should be avoided.

59. *B.* The quantity of food should always be proportioned to the digestive powers of the stomach and the wants of the system. Where waste is great, and growth active, an abundant supply of food is requisite, and the desire for it is commensurate with the demand. Those who lead sedentary lives, and whose circumstances admit of free living, are peculiarly liable to dyspeptic complaints, owing chiefly to the quantity of food indulged in. It is indispensable to a due and natural supply of aliment to the stomach, that attention be paid to the preliminary processes of mastication and deglutition. If these be performed too hastily, too much food will be received in a short time, in a state of insufficient preparation, and the stomach will be overloaded, before the sensation of hunger can be completely allayed. As the dilatation of the stomach by the ingesta, should be gradual, and ought not to exceed a certain limit, and as a definite quantity of gastric juice is secreted, according to the wants of the system and the habits of the individual, if more than the usual quantity of food be taken, the organ will be over distended and a part of it will remain undissolved, producing the usual symptoms of indigestion. Such being the case even with the healthy, how much greater will be the disorder when excesses are committed by the dyspeptic. Sir F. HADFIELD very justly remarks, "that almost every malady to which the human frame is liable is, either by high-ways or by-ways, connected with the stomach; and I must own, I never see a fashionable physician mysteriously counting the pulse of a plethoric patient, or, with a silver spoon on his tongue, importantly looking down his red inflamed gullet, but I feel a desire to exclaim, 'Why not tell the poor gentleman at once — Sir, you've eaten too much, you've drunk too much, and you've not taken exercise enough!'" — Dr. ANCRONOVIC observes "when we consider the manner in which diet is generally conducted, regard to the quantity and variety of food and drink, instead of being astonished at the prevalence of indigestion, the wonder should be that any stomach, having such duties imposed on it, is capable of digesting at all." Much, certainly, is to be done in dyspepsia, by attention to the quality of the articles of food, but *much more depends upon the quantity*. Indeed the dyspeptic might almost be independent of attention to the former, if he rigidly observed the latter. This opinion is supported by the experiments of Dr. BEAUMONT, showing that the power of digestion is limited by the amount of gastric juice provided by the stomach — an amount varying with the modes of life and the wants of the system. It is superfluous to remark that second courses, served up to gratify the pride of the host, overcome the stomach, paralyse digestion, and occasion acute attacks of indigestion.

60. It is impossible to assign any rules respecting the quantity of food that should be taken, as it depends upon so many circumstances. Mixtures of different kinds of food are injurious to digestion,

INDIGESTION ² OF THE DIET AND REGIMEN.

by the inducement to excess in quantity, which the variety affords, and by the incongruity of many of the articles. When only one dish is partaken of, Dr. COMBE remarks, there is less temptation to exceed the quantity, than when several are tried. The first intimations of a satisfied appetite, are warnings to stop eating, which should never be neglected by dyspeptics. If these be passed by, indigestion or an aggravation of it, where it is already present, will always result.

quantity of food should also have reference be amount of exercise. When little or no waste is excited by exercise, the supply should be remarkably moderate, as well as digestible. Persons who have removed from the country, where they have enjoyed active exercise in the open air, and have consequently digested well a full diet, generally become dyspeptic when they have removed to large towns, and are subjected to very different circumstances, especially if they continue the same quantity of food, or if they increase it.

61. C. *The times of eating.* In general, five or six hours should elapse between one meal and another. Even in healthy persons, digestion of a full meal is seldom over in less than four hours; and in dyspeptics, it is seldom disposed of until a much longer period has passed. The stomach, also, requires an interval of rest after the process is finished, in order to enable it to enter upon the vigorous digestion of the next meal. If food be taken before the organ has recovered itself from its previous exertion, the secretion of the gastric juices, and the muscular contractions, will be imperfect. The whole of the gastric juice which the stomach can secrete in a given time being engaged in the digestion of the first meal, the one taken too closely upon it will be inefficiently acted upon, and thereby undergo fermentation. The intervals between meals should be in relation to the quantity eaten, and the habits of the individual as to air and exercise. When the latter are enjoyed, the periods may be much shorter than when the habits are sedentary.

62. For dyspeptics, as well as for healthy persons, the meals should be regulated according to the necessary occupations and habits of the individual. For those, observes Dr. COMBE, who have day and sleep by night, an early breakfast, an early dinner, and an early evening meal, will be most conducive to health. But for those who, against the laws of nature, keep late hours, late breakfasts and dinners are preferable.—Persons who eat suppers ought not to breakfast till one or two hours after rising; but those who dine late and eat nothing afterwards, require breakfast sooner. As a general rule, breakfast about half an hour or an hour after rising will be found most beneficial. Those who are obliged to rise very early, should take a cup of coffee or tea with a biscuit soon after getting up, and a more substantial breakfast about three hours afterwards. If exposure to cold, to the morning dews, or to unwholesome air, or to any other cause of infection be incurred in the morning, the stomach should be fortified by coffee or by breakfast. The dyspeptic, especially, ought never to travel, or to enter upon any exertion with an empty stomach, and never with an overloaded one.

63. As a general rule, not more than five or six hours should elapse from breakfast till dinner. For youth and convalescents, and for persons

taking active exercise in the open air, the interval may be somewhat shortened; but for sedentary persons, it may be much prolonged. Much, however, should depend upon the appetite, which ought to have returned some time before dinner is taken. According to this, the most suitable time for this meal, is about two o'clock. As many dyspeptics as well as others cannot dine until much later in the day, ought nothing to be taken till five, six, or seven o'clock? or ought a light repast to be taken at one or two o'clock, and the appetite be chiefly reserved for a substantial meal at a much later hour? When dinner cannot be taken until eight or nine hours after breakfast, it will be necessary to have some refreshment in the meantime; but it should be in relation to the time that will elapse until dinner, and to the exercise taken. For persons of sedentary habits, a biscuit and a glass of water will be sufficient; but for the active and the young, especially if the interval be long, a more substantial luncheon is necessary. The habit of resorting to pastry-cooks for refreshment, and of taking wine with it, is generally prejudicial, and particularly in dyspepsia. When dinner cannot be taken until a late hour, it should always be postponed for half an hour or an hour, until excitement or fatigue has subsided.

64. When the dinner is early—from one to three o'clock—a light meal of tea or coffee and bread is necessary; but when the dinner is late, or little exercise is taken after it, tea or coffee should be used merely as a diluent, and no food ought to be eaten. After an early dinner, admitting of time for its digestion and a return of the appetite before a late hour, a third meal, of light aliments, and in moderate quantity, should be taken, particularly by persons engaged in the open air. When intemperance is practised by the dyspeptic, particularly when he lives actively, and retires to bed with an entirely empty stomach, he is quite as likely to have disturbed sleep and unpleasant dreams, as if he had his stomach loaded. He may even be wakeful and irritable, or experience a sense of unpleasant emptiness or gnawing at the stomach. All these may be removed by a basin of arrow-root or sago, about an hour before bedtime. A light supper may therefore be taken, when the dinner is early; but it should be at least an hour or two before retiring to rest.

65. D. The dyspeptic, as well as other valetudinarians, inquire, *What ought we to drink?* but they rarely follow the question by the next important one, *When should we drink?* And they never inquire as to the temperature at which fluid should be taken. a. Respecting the first of these questions, it may be stated, that water—either spring water, or toast-water, is the safest if it be taken only according to the dictates of thirst. Whey, fresh small beer, soda water, and seltzer water, are of service in many cases, as will be noticed hereafter; but fermented liquors and wines require greater restrictions. The young dyspeptic ought never to drink any thing but water, toast-water, or whey. The more stimulating beverages will be prejudicial to him, unless during states of debility, for which it may be necessary to prescribe them medicinally. Of all these, spirituous liquors are the most injurious, and ought never to be taken in any form, nor in any variety of indigestion. Some of the asthenic states of the complaint, which are benefited by a moderate

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use of wine, are exasperated by spirits, or even by malt liquors. Dr. BEAUMONT found on examining Sr. MARTIN'S stomach, after a free indulgence in ardent spirits for several days, the villous surface covered with erythematic and aphthous patches, the secretions vitiated, and the gastric juice diminished in quantity, viscid, and unhealthy, although he complained of nothing, not even of impaired appetite. Two days later, when matters were aggravated, the erythematic appearance was more extensive, the spots more livid, and from the surface of some of them, small drops of grumous blood exuded. The aphthous patches were larger and more numerous, the mucous covering thicker than usual, and the gastric secretions much more vitiated. The fluids, extracted from the organ, were mixed with much thickerropy mucus and muco-purulent discharges, slightly tinged with blood. Yet Sr. MARTIN complained only of an uneasy sensation, and a tenderness at the pit of the stomach, with vertigo and dimness of vision on stooping. The tongue was covered with a yellowish brown coating, and the countenance was somewhat sallow. After a few days of low diet with mild diluents, the inner surface of the stomach assumed its healthy state, the gastric juice became clear and abundant, the secretions natural, and the appetite voracious. Dr. BEAUMONT adds, that the free use of ardent spirits, wine, beer, or any intoxicating liquor, when continued for some days, invariably produced these morbid states. Eating voraciously or to excess, and swallowing food imperfectly masticated, or too fast, produced the same effects when repeated frequently in close succession. (*Exper. and Observ. &c.* p. 277.). He often observed that, when stomaclic disorder, with febrile symptoms, was present, or when influenced by violent mental emotions, the villous coat of the stomach became red, irritable, and dry; and that but little gastric juice was secreted on the food being taken, digestion being very much prolonged. No more wine, therefore, nor more of any other fermented liquor, should be taken, than may be found sufficient to support the strength and ameliorate the symptoms of the dyspeptic, without quickening the circulation.

66. *h.* As a general rule, the desire for fluids is the chief indication of the time at which they ought to be taken; but large draughts should be avoided, as the stomach becomes suddenly distended, the juices diluted, and the muscular coat weakened by them. Besides, much more fluid may be thus taken than is necessary for the wants of the system. The dyspeptic ought never to drink largely, either during, or soon after, a meal. Frequent sipping, or drinking by mouthfuls, will be much more beneficial, and ultimately, more quenching of thirst. Mild drinks are best taken about three or four hours after a solid meal. It is then that tea and coffee are used as beverages. These are always injurious when made too strong, or taken in large quantity, especially to the dyspeptic. Soda water drank at the time of dinner is hurtful, by distending and over exciting the stomach. Seltzer water is less so; but it is often of service some time after a meal, when there is much thirst. Soda water is then sometimes also of use.

67. *c.* The temperature at which fluids should be taken is of the utmost importance to the dyspeptic. Extremes of temperature are injurious

even to but also to teeth. The ban quantities of cold have been often demonstrated to be very superfluously consumed. Sr. MARTIN remarked, that a gill of water at a temperature of 55°, received into Sr. MARTIN'S stomach when empty, reduced the heat of it from 99° to 70°, at which it stood for a few minutes, and then rose very slowly. This experiment explains the injurious effects produced upon weak stomachs by cold fluids taken during digestion, and the fatal effects of very copious draughts of cold water whilst the body is fatigued and perspiring; the shock which the constitution receives from having the temperature of the most vital and central organ suddenly and remarkably depressed, paralysing the other vital movements. It having been demonstrated, that a temperature of 90° is requisite to healthy digestion, it must follow, that the use of ices, and particularly iced creams after dinner, or when digestion is proceeding, will be most injurious. A fit of indigestion is often caused by them; and they seldom fail of lowering the vital tone of the stomach during the digestive process. The moderate use, however, of cold or iced water, or of water ices, when this process is completed, and when there is no exhaustion, is beneficial, by inducing a salutary reaction in the organ. Ices can be only taken slowly, and in small quantities at a time; hence they produce a much less sudden fall of temperature of the stomach than draughts of cold fluids. Dr. DUNGLISON states, that labourers in Virginia were frequently killed by drinking copiously of spring water when over-heated; but that such accidents have rarely occurred since they have been supplied with ice. The proper temperature at which soups, tea, coffee, chocolate, &c., should be taken, may be stated at about 100°; and at this grade of heat, liquids will be found more quenching to thirst than at a higher or lower temperature.

68. *E.* The conditions necessary to promote healthy digestion require a brief notice. The determination of the circulating fluids to the digestive mucous surface and collatious vessels, and the copious secretion from these viscera during digestion, require that the function should not be disturbed by moral or physical perturbation or exertion. Rest of body and tranquillity of mind for a short time before and after, but particularly after eating, is hence conducive to digestion. Whatever derives the nervous energy and the circulating fluids from the digestive viscera, or causes oppression of these viscera by over-loading the large veins, is injurious during digestion. Hence blood-letting, hot or cold bathing, mental shocks, exertions of any kind, and other circumstances which operate in this way are more or less hurtful. As the quantity of gastric juice requisite to the digestion of a full meal is generally secreted in an hour or an hour and a half after it is taken, or at least within two hours even in the dyspeptic, bodily and mental repose is beneficial during this time. It is thus that a siesta after dinner is found so serviceable to the dyspeptic. But, by promoting digestion, it favours supply, diminishes waste, and consequently induces vascular plethora, and the usual consequences of

of the mind has a powerful influence on the hilarity and ease of mind promote this action; whilst care, anxiety, envy and dissipation, impede it. Dr. CALDWELL remarks, that dyspepsia commences perhaps as often in the stomach. It is almost exclusively a complaint of the studious, the scheming, the daring adventurer, the stock-jobber, and the speculator, and of those who, over-exerting their brains, thereby injure them.

69. ii. *Of the Diet and Regimen with reference to the different states of Dyspepsia.* The observations of Dr. TOWN as to the diet suitable to the different states of dyspepsia, are extremely just and precise; I shall, therefore, avail myself of some of them. *A. During the asthenic forms of indigestion*, the quantity of food should be reduced to the power of disposing of it; such articles as are difficult of digestion and weaken the stomach being altogether withdrawn.—*a.* The patient should be confined to a spare diet of animal food, and to a restricted use of fluids. A bulky meal ought always to be avoided; and when the appetite is impaired, abstinence will be frequently preferable to the use of stomachics. When the appetite does not fail, which is often the case when dyspepsia is produced by mental exertion, the patient should cease eating before the appetite is altogether allayed. The tea or coffee at breakfast should be taken with very little milk and sugar, and very little butter ought to be used. An egg, lightly boiled, may be eaten by those who take sufficient exercise. The dinner should consist of lean animal food, particularly mutton, poultry, game, and venison, which ought to be roasted or broiled. Bulky vegetables should be avoided; but meaty potatoes, yams, or rice, mixed with the gravy of the meat, young summer turnips, cauliflowers, or French beans, may be taken sparingly. The least hurtful fruits are strawberries, morel cherries, and mulberries; but they should be eaten part of the luncheon, rather than after dinner.

iii. Even when there is thirst, should be taken slowly, and in small quantity, and always after a meal. If the digestion or habit require the stimulus of wine, old sherry or old port, with an equal part of water, should be preferred; but the quantity of either or of both should not exceed two or three glasses. Twice-dressed meat, *rechauffées*, and made dishes, ought not to be eaten; and the food should be masticated slowly and thoroughly.

70. *b. The kinds of food most injurious in this variety of dyspepsia*, and therefore to be avoided, are sweet, mucilaginous, or acid fluids, and such as contain much milk; puddings, compound dishes, and meat pies; new bread, or heavy unfermented bread; compact or fat dumplings, and pulaceous articles; creams, curds, custards, cheese, and all preparations of milk; fat meat, particularly pork or bacon, young meat, all gelatinous parts of meat, and salted or smoked meat; the less digestible species of fish, and all shell-fish; strong broths, gelatinous soups, or concentrated dishes; melted butter, oil, sauces, spices, condiments, and pickles; bulky or flatulent vegetables, especially cabbages, waxy potatoes; root-herbs, beans, peas,

cucumbers, &c.; most fruits, whether fresh or preserved; currants, gooseberries, apples, plums, melons, all kinds of nuts or kernels, and preserves or jellies. Malt liquors, particularly ale, perry, cider, home-made wines, punch, and shrub should also be avoided.

71. *c. Regular exercise* ought to be taken in the open air; and the kinds of exercise that bring the greatest number of muscles into moderate action should be preferred. CRUSUS very justly advises persons subject to stomach complaints, to exercise the upper extremities and parts of the body. There are several amusements which have this effect, especially billiards, fencing, rowing, cricket, &c. For females, singing, dancing, skipping, battledore, dumb-bells, and the exercises recommended by Mr. D. WALKER, will be found very serviceable, especially when confined to the house by weather, or when exercise on horseback or on foot cannot be taken.

72. *B. The diet and regimen most suited for the irritative states of indigestion* differ considerably from those now recommended. In this variety, bland, farinaceous, and semi-fluid food, in small moderate quantity, is the most appropriate, until vascular disorder of the villous coat of the stomach is removed by treatment. Saccharine, farinaceous, feculent, mucilaginous, and acidulous articles of food are most easily digested in this condition of the organ. Gentle exercise, as gestation in a carriage or on horseback, sailing, swinging, and walking, is preferable to the more exciting kinds of exercise. After digestion is completed, tepid or warm bathing, and frictions of the surface, are generally beneficial. When vascular excitement is removed, the patient may gradually adopt the diet advised for the preceding variety, beginning with light chicken, mutton, or veal broth, with toast or rice; and afterwards the more digestible kinds of solid food may be used.

73. *C. The wines and beverages best suited for indigestion* are old sherry or port diluted with equal parts of water, the finer kinds of claret, hock, white hermitage, and Sauterne; but these should not be taken in the irritative forms of dyspepsia until vascular excitement of the villous coat of the stomach is removed. The diluents most beneficial are seltzer water with a small quantity of hock, or seltzer water with milk or whey, or lime-water with milk or black tea, according to the peculiarities of the case. In the more irritable states of the stomach, whey, goat's whey, small quantities of seltzer water, or the imperial drink, should be preferred. When the state of the urine indicates the impropriety of using vegetable or mineral acids, the alkaline carbonates may be substituted; but, when indigestion has induced a torpid or disordered state of the biliary organs, not connected with inflammation, beverages slightly acidulated with the nitro-hydrochloric acids will be found serviceable.

74. *D. Several mineral waters*, both natural and factitious, are most excellent aids in the treatment of the several forms of indigestion.—*a.* In the *asthenic variety*, the mineral springs of Clifton, Malvern, Bath, and Tunbridge Wells, and the carbonated chalybeate waters of Spa, Pymont, Carlsbad, Marienbad, Swelbach, and Eger, on the Continent; or their imitations prepared by Dr. SARGENT, are generally beneficial.—*b.* In the *irritative states of dyspepsia*, the springs of

Hartwogate, of Ems, Plombières, Vichy, and of Marienbad, or other alkaline mineral waters, will be used with advantage. When the functions of the liver are disordered, the waters of Cheltenham or Leamington, or of the Baulh Spa, and the springs of Seidschutz and Pullna may be preferred; but when excitement of the villous coat of the stomach, and when the functions of the excreting viscera are restored, the aerated chalybeate waters, already mentioned, will be most serviceable.

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INDURATION. — SYNON. *Induratio* (from *Indurare*) to become hard. *Induration*, En-

durcissement, Fr. *Induramento*, Ital. *Die Härtung*; *verhärtung*, Germ. *Hardening*.

CLASSIF. — GENERAL PATHOLOGY. — *Morbid structure* — *Therapeutics*.

1. Induration is either *physiological* or *pathological*. The former proceeds — *first*, from the changes which take place in the tissues during the progress of AGE (see that article); and *secondly*, from the increased nutrition and vital cohesion, consequent upon great activity of the vital manifestations of the part. This latter state, however, can hardly be termed induration. The *general pathological relations of induration* only require notice at this place. The specific conditions of it in the different tissues and organs are noticed in the articles on the pathology of these parts.

2. i. Induration may exist in a *simple state*, and unconnected with any apparent deposition of fluid or morbid product. In this case, it is merely a greater density of the natural structure, owing to some change in its nutrition, without any morbid secretion or further lesion of organisation. Various tissues and organs occasionally present this alteration, as the brain, the liver, the muscular structure of the heart, the cellular and fibrous tissues, the bones, the glands, pancreas, ovaries, &c. It may be independent of any change in the size or form of the part; but it is often connected with an increase of size, constituting *hypertrophy with induration*.

3. ii. Induration may depend upon an *infiltration of a fluid or solid matter* into the areolar or peculiar structure of a part — of serum, lymph, albumen, fibrine, or even of blood. The excited, or otherwise altered, action of the capillaries of the part may give rise to the effusion of these matters in a more or less fluid state; but they subsequently undergo various changes as to consistence or even organisation, their watery parts being absorbed, and the albuminous or fibrinous portions becoming more or less changed, or even identified with the structures which they infiltrate. Many of the lesions observed in the cellular tissue and parenchymatous organs — in the lungs, liver, spleen, glands, &c. — are owing to this species of alteration.

4. When the matter thus deposited is of a *peculiar or adventitious nature*, whether pre-existing in the blood, or produced by a change in the vital condition of the part, or of the constitution, the tissues, which are the seat of induration, undergo a succession of changes, and they as well as the matter which infiltrates them, or is deposited in them, assume peculiar forms, as in scirrhus, cancer, &c.

5. iii. Induration may proceed from the *absorption of the more fluid constituents of the tissues*. This seldom occurs, excepting from compression, owing to the effusion of fluid, or the development of morbid structures in their vicinity, or in enveloping parts. Effusions in the pleura and false membranes formed on its surface produce this change in the lungs; and the fibrous or fibro-cartilaginous formations in other situations produce a similar alteration, as in the spleen, &c. This form of induration may often be said to be rather a state of condensation or atrophy with induration. The distension, produced by the accumulation of natural secretions cannot be comprised amongst the forms of induration.

6. iv. Indurated parts *vary in appearance* — in colour, size, and form. 1. The colour is generally

changed, being often pale, owing to diminished vascularity and the deposit of albuminous matter; and sometimes red, greyish brown, yellowish, &c. These hues evidently depend upon the vascularity, and the state of stagnant fluids, and of effused or infiltrated matters. 2. The size of indurated parts may not be changed; more frequently it is increased, and sometimes it is diminished. 3. The form of the indurated part may or may not be altered.

7. v. The causes of induration may, in general terms, be stated to be whatever excites the vital actions of the part, or occasions a slight or protracted irritation of its capillaries. Induration from compression, however, cannot be ascribed to these causes. M. ANDRAL remarks that, — 1. Irritation may be the first phenomenon apparent, evidently preceding irritation and continuing with it. — 2. Irritation, having produced induration, may cease, induration alone continuing. — 3. Induration sometimes occurs without any evidence of pre-existing irritation. — 4. At an advanced period of induration, the quantity of blood sent to the part is actually less than before its induration, its vitality being also less than before this change of structure. — 5. In some cases, a secondary irritation may arise, at a longer or shorter period after the formation of induration. This secondary irritation sometimes restores the indurated part to its healthy condition; but more frequently it is productive of the most injurious consequences, causing ulceration, softening, &c.

8. vi. TREATMENT. — Induration in vital organs can seldom be ascertained, so as to enable the physician to enter upon its treatment with much hope of success. Alterations of sensation, motion, and size, sometimes lead to a belief in its existence. When these exist with weight or tension, and marked disturbance of function, vascular depletion, general or local, according to circumstances, derivatives and courses of alteratives, are the chief means upon which reliance can be placed. The alkaline solutions, the preparations of iodine, and mild mercurials, with narcotics, are sometimes useful; and the various modes of deriving irritation to external parts, should not be neglected. But both alteratives, deobstruents, and derivatives, ought to be continued for a sufficient time to test their efficacy. When the indurated part is near the surface, deobstruent plasters, and frictions with discutient liniments, embrocations and fomentations, may be severally employed. In all cases, it is necessary to prevent disorder of the digestive organs, to allay pain and irritation by anodynes, to promote the natural secretions and excretions, and to preserve the constitutional powers by light nourishment and change of air. When induration proceeds from compression, the removal of the compressing cause should be attempted, if circumstances admit of its accomplishment.

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INFECTION. — SYN. From *Infectio*, *grium*, *Contagies*, *Contagio* from *con* *tungo*, Lat.; *Infection*, *Contagion*, Fr.; *Infektion*, Germ.; *Infezione*, *Contagione*, It.

CLASSIF. — GENERAL PATHOLOGY — *logy*. GENERAL THERAPEUTICS — *phylactics*.

1. In the view which I am about to take of infectious agents of their operation, and of effects, it will be necessary to premise a few marks as to the meaning I would attach to the word *infection*, as well as to other terms which have been usually considered as synonymous with it, or as expressing modes of the same agency. By some writers, the words *infection* and *contagion* have been received as altogether synonymous, whilst others have drawn distinctions between them. Few, however, of the latter have agreed on the subject. *Quersnay* first attempted to give precision to the application of these terms, but with little success. Since his time the word *infection* has been commonly applied to the communication of disease from the sick to the healthy, by a morbid miasm or exhalation diffused in the air; and the word *contagion* to the transmission of a specific malady by immediate or mediate contact. But it is obvious that these are merely modes of the same agency in the majority of instances; for the humidity of the air becomes a medium of contact in the former, as much as the clothes of the sick are the media of it in the latter, the chief difference being, that the one acts only by being diffused in the air, whilst the other may act either in the same way, or it may directly convey a consistent virus or morbid secretion. In cases where substances have become the media of absorbing and retaining the morbid emanations or the effluvia of specific diseases, and thereby transmitting them, it must not be inferred that the infection is produced by contact of any part of the external surface of the healthy person with the substance thus imbued. The clothes worn by a person whilst labouring under a disease strictly contagious, even according to the above acceptation, may be so imbued with the morbid exhalation as to retain it for a long time, especially shut up from the air, and may afterwards upon being unfolded and exposed, and thereby propagate the disease to an individual who has never come in contact with the substance which has thus proved the *fomes* of contagion. Instead, therefore, of considering these distinctions as constituting a true difference, it will be preferable to view *contagion* as a mode of infection, to which certain limitations should be attached.

2. M. *Rochoux* considers that infectious agents may be divided into those which, like germs, are capable of reproducing and multiplying themselves in organised bodies, and into those which are devoid of this character, and require for their propagation certain accessories, without which they will not appear. The former of these represent contagious, the latter infections. M. *Dupuytren* observes, that infection is the contamination of the air by persons confined in low, close, ill-ventilated, and dirty situations, and by vegetable and animal substances undergoing decomposition, the emanations with which the air is thereby charged acting on man as poisonous agents. The sources of these emanations are

in proportion to the grade of atmospheric purity and temperature, and to the nature and quantity of the miasms which the air contains. Contagion, on the other hand, he considers to be in many respects independent of atmospherical conditions, and a species of germ or virus developed in the bodies of the sick, or forming an atmosphere around them containing the principle of the malady; and through the medium of this germ, virus, or morbid principle, the malady is transmitted to the healthy. When we consider the diverse states and kinds of agents to which the terms infection and contagion have in general been indiscriminately applied, and the close approximation of several of these agents to each other, as respects their properties and effects on the living economy; and when we further consider the modifications each of them experiences in the ever-varying conditions in which they present themselves, and from the several circumstances and accessory influences which are associated with them, the difficulty of assigning to them specific distinctions will be evident. Yet the difficulty should not preclude attempts at distinctions, and at arrangements founded on such distinctions, as a greater precision of knowledge than now exists will, to a certain extent, result even from a partial attainment of these objects, and will be extremely conducive, not only to an acquaintance with the influences by which these agents are modified, and with the changes they effect on the human economy, but also to the suggestion and acquisition of means by which their effects will be prevented, or be counteracted where prevention cannot be accomplished. The chief fault of distinctions drawn between *infection* and *contagion*, and at the arrangement of the various modes and kinds of these agencies, is, that both the one and the other are based upon preconceived and narrow views of their nature and operation, involving, moreover, various opinions by no means consonant with the usual procession of morbid actions. The obvious course, therefore, is to make distinctions only where differences actually exist, applying terms with precision, according either to their received meaning, or to the sense in which it is required to receive them, and to arrange phenomena according to the relations established by close observation and candid description. In the following remarks I use the word *infection* in its generic acceptance, employing it according to the meaning attached to it by VIRGIL, OVID, PLINY, and other classical writers of antiquity, and by many modern authors; and applying it to whatever may effect, so as ultimately to *taint*, *pollute*, or *corrupt the body*. I use also the word *contagion* in the sense imposed on it by VIRGIL, PLINY, COLUMELLA, and CURTIUS—as an *infection by immediate or mediate contact*—as a *pollution by the touch*. The word *contamination* may with justice be applied to the deterioration or morbid change which takes place in the fluids of the body during the course of infectious maladies. The terms *morbid impression* and *morbid influence* will represent the change first produced, particularly on the nervous system, by the agents of infection. Although the effluvia or emanations from the sick, the secretions formed in the course of infectious diseases, and the putrid fluids in the bodies of the dead, generally act upon the living, when applied in a manner suited to the operation of

each, as *animal poisons*, yet I will restrict this term to those agents which are usually thus designated.

3. From this it will appear that the word *infection* is here employed in its most extensive application; and that the words *contagion*, *contamination*, *morbid impression*, or *influence*, are used to express the chief modes in which it takes place, and the chief states in which it may exist. Receiving therefore *infection* as the generic appellation, the other terms represent *species* arranged under it. In other words the frame may be infected—1st, by the *morbid impression* of agents—*internal* or *self-generated*, or *external* and *mephitic*, the infection being limited to the individual, and incapable of propagating its kind.—2ndly, by the *contamination* produced by animal effluvia, the infection being capable of propagating itself in certain ascertained circumstances, and of spreading to the healthy from those affected by these agents. 3rdly, by the *morbid impression* or *contamination* of specific emanations and secretions, the infection presenting certain specific effects, or disseminating and perpetuating specific maladies.

4. The various influences and agents, by which the human frame is infected throughout, come under one or other of these modes of operation. They consist chiefly of miasms or exhalations from vegetable matters in a state of decay; of unwholesome or noxious ingesta; of effluvia from dead animal matter; of the emanations from the healthy in confused situations, and from the sick in several diseases, and in the various circumstances favourable to their accumulation or concentration; of septic matters arising from animal decay; and of palpable or more or less consistent secretions. But several infectious agents may be associated in their operation. The miasms or exhalations from decayed vegetable matter, or from the soil, &c. may be conjoined with the effluvia from animal substances. Some of them may act directly, or in the vicinity of their sources only, as those derived from vegetable and animal decay. Others not only operate in this way, but also through the medium of substances which imbibe and retain them in a sufficient quantity to be injurious. They admit however of certain general propositions being stated with respect to them; and of the following arrangement, with reference both to their nature and effects.

a. *Infesting agents* consist almost entirely of decayed or diseased organised substances, and of animal emanations or secretions.

b. Those agents which proceed from the decay of vegetable substances or principles, although they infect the frame exposed to their sources, are yet incapable, when unaided, of producing those states of action generating a seminum, or morbid principle by which they may be propagated from the sick to the healthy.

c. Organic bodies in a state of decay or disease, and animal secretions, *infect* the human frame chiefly during states of predisposition or susceptibility of the frame, certain only of which states are ascertained.

d. The *morbid actions* produced by infectious agents generally assume specific forms according to the nature of the agents, so that the agent being known, its effects may be predicated; and on the other hand, the nature of the agent may be inferred from the form and characters of the existing effect.

INFECTION — CLASSIFICATION — THE SOURCES OF INFECTION.

CLASSIFICATION OF INFECTIOUS AGENTS.

| Class of Agents. | Order of Agents. | Species of Agents. | Diseases resulting therefrom |
|---|---|--|---|
| I. NON-DISSEMINATING, AND NON-PERPETUATING INFECTIONS. <i>Infu-infectants.</i> | i. <i>Miasms or mephitic vapours — Endemic Infection — acting through the air.</i> | 1. Miasms from decayed vegetable matter aided by moisture, in temperate ranges of atmospheric heat.
2. Exhalations from absorbent, or deep, exuberant, or marshy soils, suspended in atmospheric humidity at temperate grades of warmth.
3. Miasms or vapours from decayed vegetable matter, or from marshes and rich, deep, and humid soils, at high ranges of temperature. | Catarrhal fevers. Rheumatic attacks. Intermittents. Enlargement of the spleen, and lup states of the liver.
Intermittent Remittents. Simple dysentery. Simple cholera. Bilious fevers. Catarrhs, and other diseases of the secretory and glandular organs.
Induramatory, bilious, and ague fevers of both a remittent continued type. Diseases chronic of the abdominal viscera. |
| | ii. <i>Unwholesome and poisonous ingesta — Infections occasionally epidemic.</i> | Unripe, diseased, or decayed grain. Diseased or putrid fish or flesh. Water containing putrid animal matters, &c. &c. &c. | Ergotism. Gangrenous ergotism. Asthenic and chronic diarrhoea. Dysentery. Scurvy and scorbutic dysentery. Mucous, gastric and putro-dynamic fevers.
The carcinoma and fungo-haematoid cachexy. |
| | iii. <i>Self contaminating agents, or morbid matters formed in a part, afterwards contaminating the system generally.</i> | 1. Cancer. Fungo-haematoid disease, &c.
2. Purulent, sanious, or other morbid secretions carried into the circulation. | Acute hectic. Low remittent, and adynamic states of fever, often attended by phlebitis or purulent deposits in the viscera or joints. |
| II. CONDITIONALLY PERPETUATING INFECTIONS. — <i>Contaminating infections.</i> | i. <i>Animal effluvia — Producing diseases propagating the same or similar maladies in favourable circumstances Conditionally and consequently infectious, chiefly by means of diffusive and impalpable emanations.</i> | 1. Effluvia from animal matter or from vegeto-animal matters during decomposition, aided by humidity.
2. Emanations from living bodies in close or unventilated situations.
3. Emanations from the secretion and discharges of the sick confined in close apartments, &c., and the direct application of these secretions. | Adynamic or pernicious remittents. Continued fevers. Adynamic dysentery. Cholera. Gastric, mucous, or enteric fevers.
Adynamic putro-dynamic, &c., and malignant fevers. Malignant dysentery. |
| | ii. <i>Animal secretions and septic animal matters — Infectious chiefly by contact, or inoculation of a palpable matter; chiefly sporadic.</i> | 1. Morbid secretions in recently dead bodies.
2. Animal matter in a state of putridity or decomposition.
3. Morbid secretions communicated from the lower animals by contact or inoculation.
4. The poisonous bites of insects and reptiles. | Erysipelas. Hospital gangrene. Phlebitis. Puerperal fever.
The irritative fever, or malignant effects produced upon opening recent bodies, by the morbid secretions poured out in serous cavities.
Diffusive or disorganising inflammation of cellular parts. Inflammation of lymphatics of veins, &c.
Glanders. Farcy malignant pustule and other affections arising from contaminating diseases in the lower animals.
General vital depression, and septic disorganization, or solution of the vital cohesion of the tissues. |
| III. SPECIFIC INFECTIONS. — Infections immediately or mediately disseminating and perpetuating their kinds, by a morbid intussusception, or by contamination, or by both. Capable of retention and communication by foci. | i. <i>Impalpable specific infections of susceptible persons. Diffusive or volatile infection. Frequently epidemic.</i> | Emanations from the secretions, excretions, and surfaces of persons already affected. — Propagating of the kind by a diffused and impalpable effluvia, or vapour. | Epidemic and exanthematic typhus. True yellow fever. Pestilential cholera. Pertussis. |
| | ii. <i>Palpable specific contagions. Consistent</i> | A specific secretion or virus from the seat of disease perpetuating maladies always presenting the same characters. | Rabies Syphilis. Gonorrhoea. Yaws. Syvens. Framboesia. Purulent or Egyptian Ophthalmia. Cow-pox. Pella-gra. Porrigo. |
| | iii. <i>Infectious both diffusive and consistent. Often epidemic.</i> | Diffusive and impalpable emanations, and consistent secretions, from the bodies of the infected, either of which may produce the same disease. | Chicken-pox. Scarlet fever. Small-pox. Measles. Malignant puerperal fever. Plague. |

5.—I. THE SOURCES OF INFECTION.—According to the extensive sense in which I have employed the term infection, its sources or agents are numerous and diversified. They may be arranged—1st. Into *Idio-infectants*, or those which produce diseases incapable of perpetuating their kinds, unless other causes be superadded;—2d. Into those which produce maladies which may be propagated under favourable circumstances—or into *conditionally perpetuating infections*;—and 3d. Into *Specific Infections*, or those which produce diseases which perpetuate their kinds, both immediately, and mediately by *foci*.

6. i.—Under the FIRST CLASS may be arranged those infections derived from (a) endemic sources;—(b) from the ingesta;—and (c) from

morbid matters generated in the body, and conveyed into the circulation, thereby contaminating the whole frame. The diseases proceeding from these sources never give rise to the infection of the healthy, unless they are modified in their characters by superadded causes, or unless they are materially influenced by determining or consecutive circumstances.—A. The *miasms* or *exhalations* from the soil produce a great variety of diseases according to the temperature and humidity of the air, and the quantity or activity of the miasms floating in it; but the diseases thus produced will not propagate themselves. If, however, other causes are superadded,—if the persons labouring under disease from this source be confined in ill-ventilated apartments, or breathe a close air

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7. *A.* — *Animal exhalations, the disease may* assume its form, and assume some one or other of those which arise from the *second class of causes* — *animal effluvia* — and thus become consecutively and conditionally infectious. I could adduce numerous instances of diseases, originating in local or endemic sources, becoming thus infectious. I have adduced more than one instance of it; and numerous others are furnished in the medical histories of wars and campaigns; but unfortunately the circumstances connected with them have rarely been recorded with precision, and sometimes not even with impartiality.

7. *B.* — *The use of unwholesome food* infects the body with disease, which is not capable of being communicated to the healthy under ordinary circumstances. But persons affected with diseases from this source may be exposed to additional causes which will change the character and course of these diseases, and give rise, as in the foregoing instances, to a truly infectious property. It is well known that unwholesome and scanty nourishment will produce scurvy, scorbutic dysentery, and malarial or adynamic fevers. These fevers are generally not capable at first, or as they immediately proceed from this cause, of propagating their kinds, but they frequently assume this character, owing to states of the air, to insufficient ventilation, and to the manners and imperfect civilization of those amongst whom they occur. Proofs of this were furnished in Italy and France during 1815, 1816, and 1817, — at Marseilles in 1812, and 1813, — in Ireland during various periods, particularly since the commencement of this century, and even in the present day in some parts of England. The disease which prevailed in the Penitentiary, and which was so ably described by Dr. LATHAM, and the fevers now prevalent among the poor, are proofs of the infectious characters which distempers thus originating generally assume. I am convinced that the low dietaries assigned to the poor in the Union workhouses, in connection with crowding, and with imperfect ventilation, in many of them, have been a chief cause of the present prevalence of typhus throughout the country. And although the infectious contagion may not have reached those who have been prime movers in the iniquity, yet it may overtake some of them with no measured retribution. Persons who require the aid of the Poor Law have usually as respects food or drink, and sometimes as regards both, lived fully or intemperately; and when they are subjected to a diet, altogether insufficient for the continuance of health even in the temperate, low fever, which readily propagates its kind among the predisposed, and on occasions favouring communication, soon makes its appearance. This result the more certainly follows, when numbers are similarly circumstanced, and placed in buildings possessing no thorough ventilation or perfusion of air. The only recently erected Union workhouses which I have seen, are most improperly planned, inasmuch as they have windows only looking into the interior of the Court, of which they form three of the sides. This is shameful if it proceed from ignorance, and flagitious if it be done designedly. We can hardly suppose architects so ignorant of the most generally acknowledged principles of their art, as to neglect ventilation where it is most required. Are we therefore to consider that they

have been controlled by those who have sacrificed feelings of humanity to the expediency of political economy?

8. — From considerable observation and reflection, I infer that disease may take place sporadically, or from local causes; and owing to various circumstances acting either in close succession or coetaneously, the circulating and secreting fluids, and even the soft solids, may be so changed during its course, as to emit an effluvia contaminating the surrounding air and thereby infecting many of those who breathe this air in a sufficiently contaminated state; and thus the disease will be propagated to several, and from these to others, especially under favourable circumstances of temperature, humidity, electrical conditions and stillness of the air, and of predisposition on the part of those who come within the focus of infection. Thus diseases may become infectious, and, when aided by the constitution of the air, and other circumstances, even epidemic. After thus spreading for a time, they may cease or entirely disappear with the circumstances which combine to propagate them.

9. *C.* — *The Self-contaminating agents*, or morbid matters formed in a part, and afterwards infecting the system generally, but seldom, perhaps, give rise to disease, capable of propagating its kind. When sanious or purulent matters are carried into the circulation, the consequent alteration in the blood gives rise to phenomena closely resembling typhoid or low fevers in many cases; but I do not believe that the malady thus produced will infect the healthy, unless under circumstances peculiarly favourable to infection, as in puerperal females, in the wards of lying-in hospitals. I think it extremely probable, that the sanious fluid constituting the lochia may be absorbed or imbibed from the surface of the uterus, particularly when the uterus contracts imperfectly, or when the discharge is retained or accumulates, and when vital power is much depressed, and that the consequent pollution of the circulating and secreted fluids will give rise to an effluvia which may produce puerperal fever in a female recently confined, if situated within the focus of infection. It is not improbable, that erysipelas also may be excited by the effluvia emitted from a person thus diseased. I attended with another practitioner, a case of dangerous puerperal fever of this kind. A lady visited this patient, and leant close to her mouth, so as to hear her faint articulations, but perceived her breath so offensive, and felt it produce so unpleasant a sensation on her own face, as to induce her to remove to a greater distance. This lady continued to perceive the unpleasant odour, and to feel the sensation in the face until the following day, when she experienced chills with swelling and redness about the nose, extending over the face: — a complete attack of erysipelas followed.

10. That the morbid secretions of persons affected with low fever, consequent on the absorption of morbid matters, into the circulation, will infect the healthy frame when inserted into a wound or under the cuticle, or even when applied to a mucous surface, is by no means improbable. I have seen the most dangerous diseases arise, from the inoculation, and even from the contact of the fluids during the examination of the bodies of females, who had died of puerperal disease, caused

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by the passage of sanious or morbid secretions into the circulation, as well as by the influence of an impure air. The danger of infection or inoculation from these cases is great in proportion to the shortness of time that has elapsed from dissolution; and it is particularly great when the body still retains some of its warmth. The above considerations and facts prove that, although the several orders of agents comprised under the *first class* produce merely a sporadic form of infection, or infect merely those exposed to their sources, and give rise to diseases generally incapable of propagating their kind, yet the concurrence of additional causes or influences, during their course, will develop a disease, capable of being communicated to the healthy under circumstances of predisposition, and in similar modes, as well as by the same media, as the diseases produced by the class of agents next to be noticed.

11. ii. *The second class of agents.* A. Effluvia from animal exuvia and animal secretions and excretions directly occasion those forms of disease which infect the healthy by contaminating the surrounding air. The particular form or species of malady thereby produced, depends much upon the nature of concurrent causes — upon the concentration or accumulation of the effluvia, — upon its sources, — upon its admixture with miasms from decayed vegetable substances, — upon the temperature, humidity, and electrical states of the air, — upon the susceptibility or state of predisposition of those exposed to it, — and upon pre-existing disorder. The operation of some of the sources of infection falling under this head has been disputed. Dr. HASTORFF, by a laboured special pleading, has denied the injurious influence of putrifying animal substances; but much depends upon the temperature in which this process takes place, the concentration of the emanations arising from this source, and epidemic states of the air. When the temperature is low, and ventilation is preserved, no very acute or sudden disease results from this cause, particularly to those accustomed to it, although a gradual loss of health generally follows its continued or frequent influence. But in other circumstances, particularly when aided by concurrent causes and marked susceptibility, febrile diseases of a low or adynamic form, and of an infectious character, where free ventilation is not preserved, generally appear. The emanation from the lower animals, as horses and cattle, crowded in ill-ventilated places, produce infectious diseases, not only amongst them, but also in those of the human species, who may breathe for some time the air which is thus contaminated. LIVY, DIONYSIUS OF HALICARNASSUS, and OROSIUS, mention a destructive disease which appeared in Rome 400 years before Christ. LIVY states that it occurred in Autumn from the crowds of countrymen and herds of cattle received within the walls of the city; that it was aggravated by the infection arising from the crowded state of the close buildings, by the heat and want of rest; and moreover that the disease was propagated by contagion and by the attendants on the sick. The same historian records that, in the 325th year from the foundation of Rome, a remarkable drought and famine extended throughout the Roman territory: that diseases followed, first invading cattle, and afterwards infecting the rustics and lower classes of people,

and then extending to the city. An infectious nature may be developed in the lower animals by their confinement in close or ill-ventilated places has been proved on numerous occasions; and there is no reason to doubt the possibility of the distemper thus produced being communicated to the human species. A number of horses shut up in the hold of a transport will generate glanders in some of them, the morbid secretion of which will communicate a similar disease to persons employed about those which are affected, especially if it come in contact with the mucous surfaces. It may be stated as an axiom, that the foul air generated by the crowding of many persons or animals into a confined space, even in health, but more especially in disease, as in the wards of hospitals, &c.; or by a few persons only in the same apartment, if their diseases be attended by copious discharges, will infect those who breathe it in a state of predisposition, with low fever, dysentery &c.; and that the persons thus infected will communicate the malady to others similarly predisposed. Although animal effluvia infect the healthy chiefly by their diffusion in the atmosphere, yet the infection will not take place, unless near the sources, or in situations where they become concentrated. Much, however, will depend upon predisposition or susceptibility of persons exposed to them.

12. B. Certain maladies do not perpetuate themselves by effluvia or by an impalpable emanation, but by the contact of the secretions formed in their course; and these secretions will seldom induce disease unless they be inoculated, or come in contact with a mucous surface. Other secretions particularly from diseased animals, when brought in contact even with the unbroken skin, will sometimes produce serious distempers. Instances of this fact are furnished by the malignant pustule, and by other maladies already noticed. The inoculation of putrid animal matters, and the bites of poisonous reptiles, infect or contaminate the whole frame in a sufficiently remarkable manner, the former agents producing a low, irritative, or adynamic state of fever; but the diseases thus produced seem incapable of propagating their kind unless by the inoculation of morbid matters fresh in their course, or taken from the body after death, and then the effects will probably vary with the previous state of health of the person thus infected, and with various concurrent circumstances.

13. iii. *Of the Third Class of Infectious Agents.* It is unnecessary to add any thing to the statement contained in the classification of these agents which I have attempted. The impalpable emanations and consistent secretions of which they consist, produce specific forms of disease, whether they operate directly or by various media, or fomites. But, although the chief characters of these maladies are uniformly preserved, in all of them, during their transmission, yet several of them are much modified by concurrent causes, by the circumstances, or existing states, of the affected and by endemic and epidemic influences.

14. II. *Of the Proofs of Infection, or the circumstances proving a disease to be capable of propagating its kind.* It has been asserted by some recent writers, that the doctrine of infection, by contact or otherwise, is a comparatively modern invention. These assertions have been made by

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passed neither of sufficient medical or practical information, to attach any importance to their opinions. It has been fully shown by Dr. YAKS in this country, MARX in Germany, and Dr. OMORI in that the doctrine of contagion was recognized by the ancient Egyptians and Jews, by the Greeks by the Romans: and that it was equally believed in during the middle ages, although the notions of many respecting it, even among professional writers, were often loose and inaccurate. It is unnecessary to adduce proofs of the acquaintance of the ancients with contagion, as this has been done so satisfactorily by the writers just mentioned. Some evidence also on this subject will be found in the article EPIDEMIC INFLUENCE. Indeed the matter would never have been questioned, had not commercial men, in order to remove some impediments in the way of their traffic, properly imposed for the public good, employed persons to write in favour of their interests; but with an ability and success quite commensurate with the truth and justice of their cause. The question, however, as lately agitated, is not so much the existence or non-existence of infection or contagion in any circumstances, and as respects all diseases, for proofs of the possession of the properties by certain maladies are so incontrovertible, as not to be doubted. It is principally with respect to the infectious nature of pestilential epidemics, as plague, yellow fever, and epidemic cholera, that the subject has created so much interest and discussion at the present day. When we consider the extent to which the dread of the importation of these maladies impedes commercial undertakings, in connection with the little consideration human life receives in the prosecution of commercial objects, it is not likely that the contingent importation of infection will operate in such a manner, as long to prevent attempts at the removal of existing salutary restrictions; although the *proofs* as to the existence of an infectious property in these distempers, are considered quite conclusive by all candid inquirers.

15. i. There are various circumstances which, singly or conjoined, prove a disease to be truly infectious, or of propagating itself. — 1st. Arrival in places which are healthy of persons from districts in which a disease is prevalent, and the spread of such disease soon afterwards in the previously healthy place. — 2dly. The extension of such disease in this place, in proportion to the intercourse between the affected and the healthy. — 3d. The greater prevalence of such disease amongst persons who devote themselves to its alleviation, as amongst medical attendants, nurses, and the friends of the sick. — 4th. The absence of any other cause to which the malady may be attributed, the soil, the climate, the season of the year, the weather, neither singly nor conjointly, serving to account for it. — 5thly. The immunity obtained by seclusion and by avoiding communication with the sick and those who have visited them, as well as by the careful exclusion of all substances which may have imbibed and tainted the emanations from the affected. — 6thly. The success of measures taken to prevent the extension of the malady, as the early removal of the sick to places where communication with the healthy is prevented. Besides these, there are other proofs, which are even more conclusive.

When we perceive the healthy become affected with a malady, soon after proximity to, or contact with, a person labouring under a similar malady, or after having been exposed to substances which have imbibed the effluvia from the sick, as bed and body-clothes, &c., the evidence of infection from these sources, although not amounting to complete certainty, yet nearly approaches it. Instances of contagion by inoculation, and by immediate or direct communication with the sick, are sufficiently numerous in respect of several maladies, and are familiar to all: and the evidence of infection by substances which have imbibed a morbid effluvia or secretion — by *fomites* — is not less strong, although it is in some cases not so conclusive, and hence it has been more frequently impugned. It has been satisfactorily shown to all candid minds, and numerous instances have occurred to my own observation, of a disease having been conveyed in the clothes of a second person, and communicated to a healthy individual. That this has occurred with respect to certain maladies acknowledgedly infectious, cannot be disputed by the most captious objector. The only questions admitting of doubt are, — to what diseases should this capability of propagation be extended: and for how long a period, and under what circumstances, may the infectious effluvia be thus retained and conveyed. Some answer to the first of these questions will be obtained by what is hereafter to be advanced; as to the second, it is impossible, from the nature of the subjects involved in it, to furnish precise information. There is every reason however to state, that the body-clothes or bedding, used by a person while sick of an infectious disease, may communicate the same malady several or even many months afterwards, if they have been shut up from the air; and I have known several instances of a disease being conveyed from the sick to the healthy, the person, who has been the medium of communication, having walked a distance of upwards of two miles in this conveying it.

16. ii. Of the media by which infectious agents are communicated to the healthy frame. — a. The miasms or morbid vapours, exhaled from the sources of infection, are evidently suspended, and rendered active by the humidity of the atmosphere, in the situation in which they are discharged: for it has been repeatedly shown, that these miasms are active in proportion to the grade of atmospheric humidity, and to the circumstances which augment that humidity. Their presence in the air brings them in contact with that part of the animal economy, presenting the greatest extent of surface, the greatest vascularity, and the freest communication with the circulating system. Although the atmosphere, aided by humidity and a moderate or high range of temperature, is the usual medium of infection, especially in respect of those maladies, which emit an offensive effluvia or emanation; yet there are other media which observation has shown to be not infrequent means of communication. Numerous substances imbibe, retain for a considerable time, and convey, the invisible or infectious emanations, as well as the palpable and contagious virus, or consistent secretions of the sick, and become media, by which infection is conveyed from one person to another, from one country to another, between

